ENVIRONMENT CANADA

ENERGY RESEARCH & DEVELOPMENT PROGRAMME

1985-86 ANNUAL REPORT

Corporate Planning Group

September, 1987

Acknowledgements:

This report has been prepared by W.S. Richardson and Jane Lister of the Corporate Planning Group, Environment Canada based on material supplied by Service representatives and by individual study managers.

TABLE OF CONTENTS

Page

I Summary

A) Introduction....1

B) Environment Canada Energy R&D Programme Accomplishments 1985-86....3

i) Atmospheric Environment Service....3

ii) Corporate Planning Group....5

iii) Environmental Conservation Service....5

iv) Environmental Protection Service....6

C) Environment Canada Energy R&D Financial and Person-Year Disbursements 1985-86....10

II Service Summaries and Detailed Project Reports

Atmospheric Environment Service....15

Corporate Planning Group....61

Environmental Conservation Service....66

Environmental Protection Service....81

I SUMMARY:

A) INTRODUCTION:

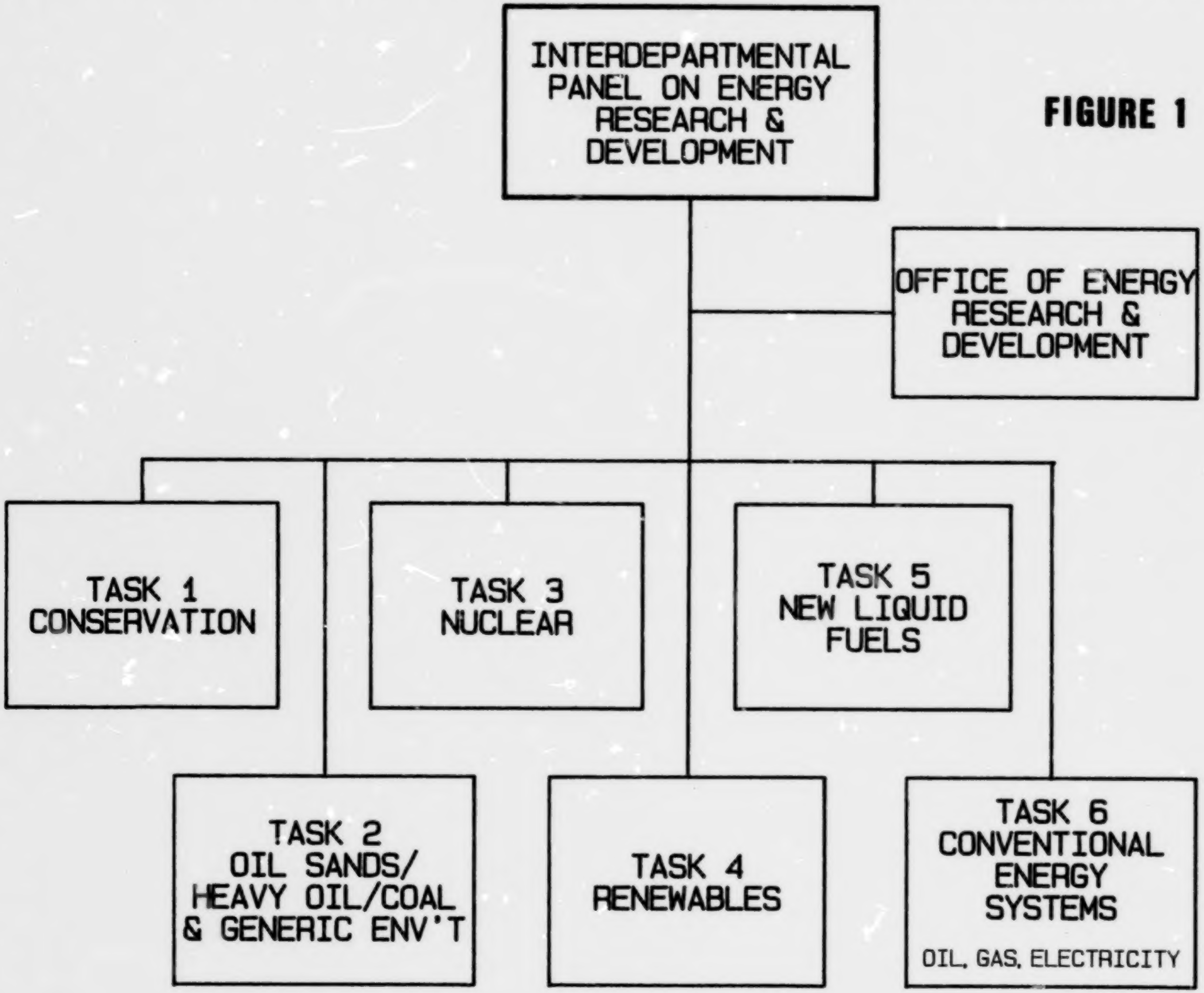
This report provides a detailed overview of Environment Canada's Energy Research and Development Programme associated with the interdepartmental Panel on Energy R&D. It does not deal with the programmes not directly associated with Panel resources (such as oil spills (AMOP) and nuclear fission power). The financial/person-year disbursements for fiscal year 1985-86 were $11.6M and 77.3 PYs of which $7.3M and 15 PYs were provided from the Panel. A comprehensive summary is provided for each Service's resources, including annual reports for individual projects. The resources discussed include those provided by the Panel on Energy R&D (PERD), Environment Canada (EC) support and others (such as DSS UP and Arctic Marine R&D).

About 65% of the PERD resources were contracted out in 1985-86. The PERD resources continue to provide a significant portion of the Department's total resources for R&D. These resources therefore play a major role in our priority areas of acid rain (ie. coal combustion control technology), toxic chemicals (ie. National Incinerator testing and evaluation programme, oil from sludge project), climate change (ie. CO2 Advisor), and human health and safety (Canadian Atlantic Storms Programme), while at the same time providing significant benefits to environmentally-sound energy development across Canada. The priority areas for federal energy R&D resources include: alternatives to gasoline (New Liquid Fuels); increased effeciency of energy use (Conservation); new energy sources (Fusion, Renewables); and, new technologies and processes for oil production (Western Basin, Canada Lands).

Figure 1 on the opposite page illustrates the PERD structure. PERD projects are funded through the six Tasks shown. The Tasks are comprised of committees which review proposals from participating Departments. The committee recommendations are forwarded annually to the Panel for approval through the Office of Energy R&D (OERD) in Energy, Mines and Resources.

FEDERAL ENERGY RESEARCH & DEVELOPMENT COORDINATING STRUCTURE

FIGURE 1


INTERDEPARTMENTAL PANEL ON ENERGY RESEARCH & DEVELOPMENT
OFFICE OF ENERGY RESEARCH & DEVELOPMENT
TASK 1 CONSERVATION
TASK 2 OIL SANDS/ HEAVY OIL/COAL & GENERIC ENV'T
TASK 3 NUCLEAR
TASK 4 RENEWABLES
TASK 5 NEW LIQUID FUELS
TASK 6 CONVENTIONAL ENERGY SYSTEMS
OIL, GAS, ELECTRICITY

B) ENVIRONMENT CANADA ENERGY R & D PROGRAMME ACCOMPLISHMENTS 1985-86:

This section highlights some of the EC programme accomplishments during the fiscal year 1985-86. Details are provided in Section II in the individual project reports (which also include project objectives, managers, contractors and publications). The numbers in [ ] brackets are the individual OERD project numbers.

i) ATMOSPHERIC ENVIRONMENT SERVICE (AES):

a) Generic - Carbon Dioxide Impacts

- Visited eight European CO2/climate research centres; published "CO2/Climate Report" (3 issues) and "Understanding CO2 and Climate - Annual Report 1985"; presented 5 seminars. [25103]

- Intercompared flux gradient and scale length models over alfalfa; evaluated response characteristics of sonic anemometer in AES wind tunnel. [25106]

b)Renewables

- Completed and submitted Askervein '83 wind energy report; developed model of wind flow over complex terrain; completed 1:2500 wind tunnel Askervein flow study report; completed anemometer field test; completed transportable version of MS3DJH model with user guide. [44101]

c)Oil and Gas

- Canadian Atlantic Storms Programme (CASP) conducted experiments on 16 Atlantic storms; ten of storms sampled in cooperation with American GALE project so that evolution of storms could be examined. This programme was a major success in integrating oceanography and meteorology in a joint effort, and in integrating meteorological research and operational staff, ideas and equipment. [67135]

- Installed permafrost monitoring stations (Churchill,Man., Mayo,Yukon);developed software to analyse and display station data; completed report on permafrost-climate areal relationships. [61407]

- Implemented global marine database; completed comparative climatology of world offshore exploration areas and field measurements of icing during CASP; held International workshop on offshore winds. [62104]

- Global and several regional sea ice data bases collected and climate information system for sea ice (CRISP) developed; completed study on climate variability and climate change; completed Hudson Bay-Foxe Severe Storm Catalogue. [62109]

- Completed west coast marine environmental altas, interannual variability study of marine climate and study of extreme value analysis for environmental parameters; carried out field measurements of icing at Green Island, B.C. [62115]

- Carried out tests of ship vs. buoy winds for development of marine surface wind forecast procedures; experiments with marine visibility forecasting techniques; demonstration of operating systems for computer worded marine forecasts. [67101]

- Evaluated SOWM and ODGP wave models for selected storm cases over the Canadian Atlantic; tested ADWAVE in operational mode; carried out field study of aspects of wave dissipation and fetch-limited short wave growth in shallow waters of Lake St. Clair; modified storm surge model to include effects of Bay of Fundy-Gulf of Maine; converted lakewave model to run for the Beaufort; ran storm surge, freezing spray and ocean wave models in real-time. [67104]

- Evaluated AES iceberg ensembles drift model with observed data; progress made on micro-mechanics approach to sea ice dynamics modelling; progress made in automatically extracting ice information from radar imagery (SLAR/SAR). [67115]

- Oil spill motion prediction system used with success in a spill emergency created by damage to one of ESSO's artificial islands. [67126]

- Modifications to two heavy gas spill models; agreement signed by AES and Concord Scientific giving Concord exclusive licence to market their model; model used for two environmental impact assessments. [67219]

d) Electricity

- Completion of literature review and testing of extreme value analysis methods for ice accretion on electric power transmission lines; continued close cooperation with the Canadian Electrical Association and its member utilities. [68203]

ii) CORPORATE PLANNING GROUP (CPG)

a) Oil and Gas

- Reviewed and published Workshop Report on Environmental R&D related to Offshore Oil and Gas Activities in Canada, July, 1985; reviewed EMR Cabinet Document on Energy R&D and prepared notes for Minister's office. [25108]

b) Oil Sands and Heavy Oil

- Chaired, contributed paper and published proceedings from workshop on Oil Sands/Heavy Oil and the Environment, Calgary, 1985; assisted in planning agenda for federal/provincial/industry Workshop on Oil Sands Tailings Pond Water Treatment, Fort McMurray, 1985. [25108]

c)General

- Co-sponsored International workshop on Winds and Icing, Halifax; provided response to Oil industry review of PERD Task 6 R&D programs; published EC 1983/84 Annual Report on Energy R&D; chaired annual budget meeting for PERD Task 2 and Task 6 Environment Committees; reviewed/finalized/updated PERD MYOP for Dept. on Task 2 and 6 Environment Committees; worked with Services and EMR to conduct budget reduction exercise of $1.1M for 1986/87. [25108]

iii) ENVIRONMENTAL CONSERVATION SERVICE (ECS) :

a)Generic

- Developed water demand forecasts for the industrial and municipal sectors and expanded database. [25102]

b)Renewables

- Identified and assessed relevant operational remote sensing techniques and hydrologic models for small scale hydro; incorporated remote sensing techniques into SSARR model and demonstrated on Tobique watershed in Saint John River Basin. [41301]

c)Oil and Gas

- Carried out velocity measurements, wave directional array measurements, bubble distributions under white caps, pressure and stress over waves. [62114]

- Designed/constructed/instrumented experimental equipment and installed model pipeline; reported on caisson retained artificial islands at the Canadian Coastal Conference, St. John's Nfld., 1985. [62307]

- Completed histopathological studies in gulls and carried out studies on Atlantic Puffin and Leach's Storm Petrel. [67208]

iv) ENVIRONMENTAL PROTECTION SERVICE (EPS)

a) Conservation

- Four projects valued at $2293K (DRECT contributions - $560K) were completed. Major portions of four active projects valued at $1557K (DRECT contributions - $434.5K) have been completed. [12201]

- Successful DRECT projects for 1985-86 include:

  Landfill Gas - Kitchener landfill gas recovery and utilization project successfully completed. Recovered gas pumped to nearby manufacturing facility where it is used as a boiler fuel.

  Waste Solvent - Recovery/recycling facility for hazardous waste developed and demonstrated.

  Continuous Colour Coat - Acid purification unit (APU) has enabled recycling of sulphuric acid, reduction of lime consumption, improved efficiency of existing waste treatment system and reduction of waste sludge requiring disposal.

  Septic Tanks - Demonstrated method of servicing septic tanks in rural areas. Method based on dual compartment truck which pumps the supernatant and sludge contents of the septic tank into its two separate compartments allowing the tank to be then washed out. The supernatant is then pumped back into the tank to act as a bacterial seed.

- Completed Technical Manual on the reduction, recycling, treatment and disposal of Biomedical Type A Waste in Canada; completed plastic recycling study; provided support for the Canadian Waste Materials Exchange; completed National Manual for the Management of PCB Wastes. [122A1]

- Retrofitted Tillsonburg municipal wastewater treatment plant used to provide parallel comparison of automated/manual operation for energy savings and improved performance; installed instrumentation and control equipment; developed/refined plant monitoring and control software; operation audit developed within program refined under UP contract and implemented at first of two municipal wastewater treatment plants; cooperative agreement signed with U.S. EPA to share and maximize project results. [12202]

- Completed incinerator test and evaluation program (part of NITEP) at the PEI Energy from Waste Facility; set up framework for undertaking a pilot scale emission control system with Flakt Canada; report on design modifications for second test site. [12203]

- Prepared report on new dewatering machine for paper mill sludges. [12305]

- Identified white water stream of stone groundwood operation as potential source of heat recovery; areas within 'Kraft' process identified as well; commenced assessment of characteristics of the commercially available working fluids: freon R113, R114 and methanol. [123A5]

b) Oil Sands & Heavy Oil

- Analysed wastewaters from 12 different oil sands and heavy oil fields including in-situ steam, combustion or combined steam/combustion recovery processes; measured phenol levels by GC and C14 activity. [24102]

-Examined treatment alternatives for oil sands tailings waters through laboratory-based screening studies; carried out preliminary economic analyses of most promising alternatives; identified potential major and widespread impacts from shaft and tunnel access concept. [24104]

- 250 produced water samples from 17 in situ heavy oil recovery sites analysed for 35 parameters; pilot scale studies on filtration of synthetic produced water completed; laboratory scale studies on vapour compression, evaporation and crystallization for total dissolved solids removal completed; tentative agreement for joint participation in field studies reached with AOSTRA and four heavy oil operators in the Lindbergh area. [24105]

management research. [24106]

c) Coal

- Completed Coal drier emission reports; Present & future water use report and report on groundwater impacts of present and future Western Coal Mining Industry in departmental editing and translation. [24201]

- Completed study of the applicability of physical strength criteria to power plant wastes (FGD solids and ash). [24303]

- Study of Summerside ash dump groundwater/leachate completed by Atlantic Region. [24304]

d)Renewables

- Completed MacMillan Bloedell anaerobic digestion pilot study;85% completed anaerobic screening studies; initiated process control studies; responded to requests for technical assistance on anaerobic digestion for approximately 10 industrial companies and OGD's. [43604]

e)New Liquid Fuels

- Generated detailed process design information for the 1 tpd oil from sewage sludge pilot plant; process and analytical equipment to assess environmental input installed and operational; tentative upgrading process (to produce diesel fuel) identified; one tonne per day oil from sludge pilot plant under construction. [51202]

- Produced and circulated 300 copies of Joint Canadian Petroleum Association/Environment Canada gas plant sludge characterization manual; completed Phase II field component of CPA/EC gas plant sludge characterization study. [57101]

- Completed steady-state characterization of process design characteristics of fluidized bed upgrader wastewater system; completed chemical characterization of one upgrader wastewater; 75% completed assessment of dynamic characterization; treatability assessment of same wastewater (aerobic completed, anaerobic 75% completed). [57103]

f) Oil and Gas

- Observed offshore waste treatment methods and regulations in Washington and Gulf of Mexico. [67201]

- Concluded, based on detailed surveys of areas of intensive exploration and regional surveys of information provided by fishermen, that there has been no significant impact on commerical fishing form debris originating from petroleum exploration off Eastern Canada; concluded that surface sedimentology in the vicinity of projects is the major determinant of accumulation and persistance of routine rig discharges; hydrochloric acid leach determined to be the best assay of potential bioavailability of metals from routine rig discharges. [67203]

- Completed study which examined the cost-effectiveness of an incineration facility for municipal solid waste with recovery and sale of waste heat in the City of Yellowknife, NWT; determined that incineration more cost-effective at discount rates of 6.9% or less. [67204]

- Compared spectral interference filters with gas cell filters (GCF) in the Oilspills unit; evaluated feasibility of achieving 10 ppm sensitivity for the unit by using active light sources. [67205]

- Tested successfully oil spill remote sensing devices at Dalhousie University 10-metre high tower using variable oils and environmental parameters and in field at the Imperial Oil site on the waterfront in Dartmouth. [67206]

- Developed process for systematically assessing the effects of dredging projects on valued Ecosystem Components in the Beaufort Sea; existing inventory of dredging activity updated to the end of 1985 and converted to a computer data base to facilitate referencing. [67207]

- Undertook contract to examine the "Physical, Chemical and Oceanographic Factors Associated with the Submergence of Oil". [67220]

- Completed data base listing wastes deposited in Arctic waters by oil and gas drilling activities; data base used to provide rational basis for selection of sediment monitoring parameters. [67225]

- Developed laboratory technique to extract biologically active portion of trace metals (Cd, Cu, Pb and Zn) in sea water and determined toxic concentrations through biological assay (oyster embryo, algae). [67232]

- Distributed internationally, questionnaire on integrated hydrocarbon monitoring system. [67237]

C)ENVIRONMENT CANADA ENERGY R&D FINANCIAL AND PERSON-YEAR DISBURSEMENTS 1985-86:

Figures 2 and 3 illustrate the distribution of PERD resources received by Environment Canada by Task for fiscal 1985-86 ($8.3M and 15 PYs). Total PERD resources allocated to all participating Departments amounted to $114M and 259 PYs. Figures 4 and 5 illustrate the distribution of PERD resources as spent by Environment Canada by Service for fiscal 1985-86 ($7.3M and 14.9 PYs). The Departmental support resources amounted to $4.3M and 62.4 PYs and additional funds from DSS UP and other outside sources totalled $972K. The Departmental resources are primarily for PY support. The total programme was comprised of $11.6M and 77.3 PYs.

Complete details on the disbursement of these resources are provided by Task in Table 1 and by Service in Table 2.

PANEL ON ENERGY RESEARCH & DEVELOPMENT

EC 1985-86 Resource Distribution by Task in K $

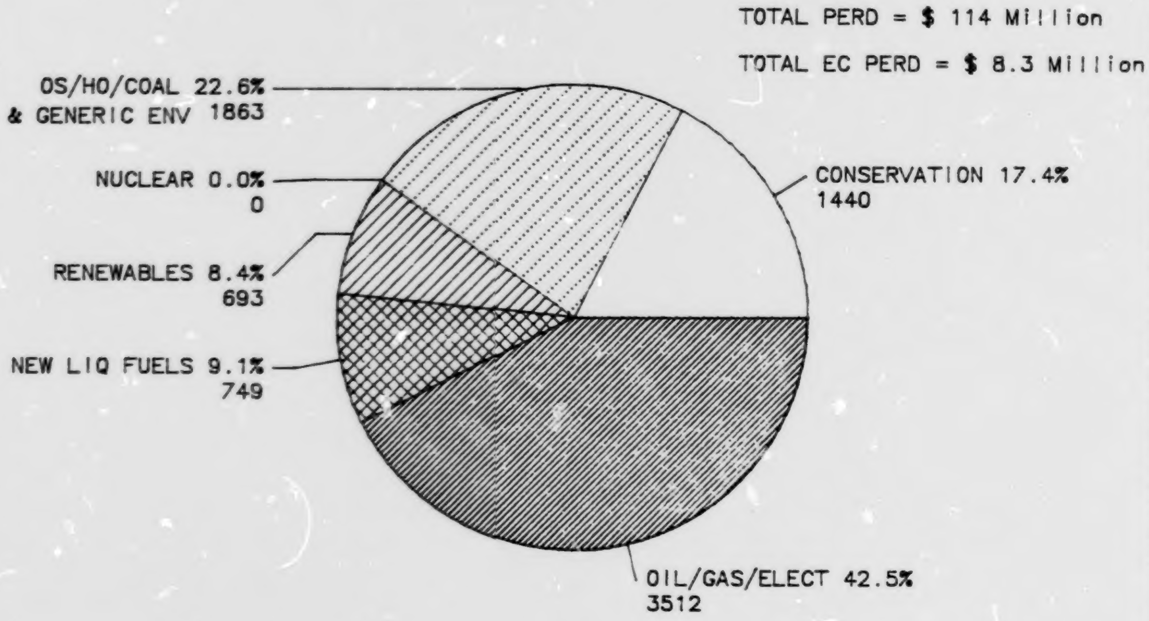


FIGURE 2

EC 1985-86 Person-Year Distribution by Task

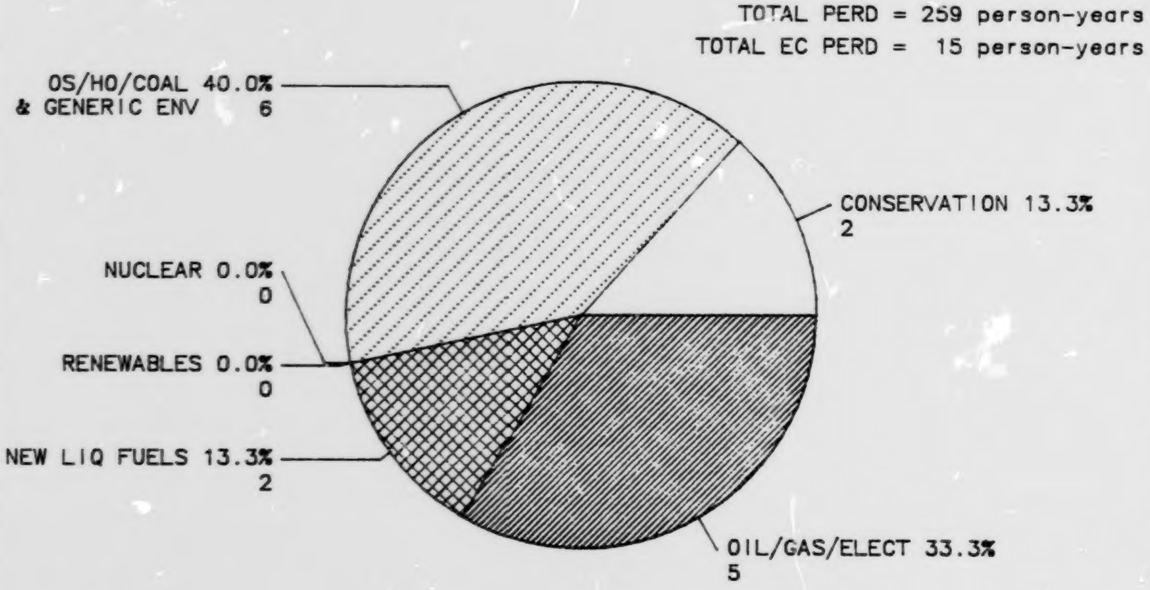


FIGURE 3

TABLE 1

DEPARTMENT: EC   SUMMARY BY TASK AND GRAND TOTAL   PANEL ON ENERGY R&D   july 10, 1987

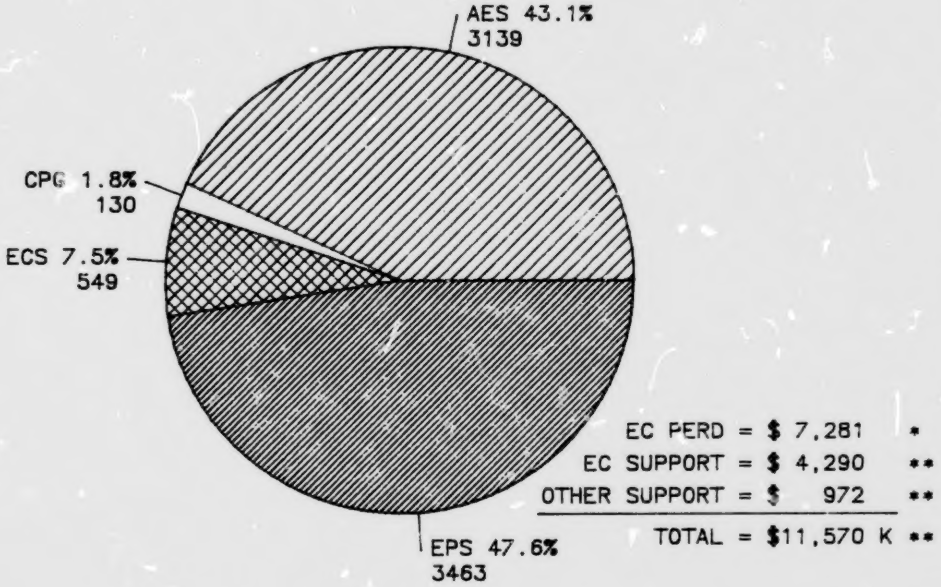
TASK	1985-86 PROPOSED PERD		1985-86 AS SPENT K$ AND PY's																										
			INTRAMURAL PERD						EXTRAMURAL PERD				DSS	TOTAL PERD	INTRAMURAL EC RESOURCES						EXTRAMURAL EC RESOURCES				DSS	TOTAL EC	TOTAL OTHER	TASK TOTAL	
	K$	PY	O&M	Capital	Sal/Ben	S/T PY	Adm PY	Contract	G&C	Sal/Ben	SA PY	Adm PY	FEES PERD	$	O&M	Capital	Sal/Ben	S/T PY	Adm PY	Contract	G&C	Sal/Ben	SA PY	Adm PY	FEES EC	$	RES $	K$	PY
TASK 1 Conservation	1440	2.0	114	55	122	2.0	0.0	928	0	0	0.0	0.0	25	1243	360	34	308	6.3	0.2	493	0	47	0.9	0.0	0	1241	372	2484	9.4
TASK 2 Oil Sands/Heavy Oil/Coal	1863	6.0	255	56	207	4.1	0.0	725	0	90	1.9	0.0	14	1345	52	30	207	4.2	0.2	0	0	105	2.0	0.1	0	394	35	1739	12.5
TASK 4 Renewables	693	0.0	76	52	8	0.4	0.0	484	0	0	0.0	0.0	18	637	26	36	441	7.9	0.8	4	0	49	1.1	0.0	0	556	16	1193	10.2
TASK 5 New Liquid Fuels	749	2.0	41	61	37	1.0	0.0	549	0	57	1.0	0.0	21	767	4	5	74	1.3	0.1	0	0	23	0.8	0.0	0	106	230	873	4.2
TASK 6 Oil, Gas, Electricity	3512	5.0	841	318	138	3.3	0.0	1881	0	58	1.2	0.0	56	3289	288	179	1472	31.9	2.8	15	0	38	1.8	0.0	1	1993	319	5281	41.0
GRAND TOTAL	8257	15.0	1327	542	512	10.8	0.0	4567	0	205	4.1	0.0	134	7281	730	284	2502	51.6	4.1	512	0	267	6.6	0.1	1	4290	972	11578	77.3

Notes:

S/T PY = Scientific, technical, person year allotment for specific project.
SA PY = Scientific authority person year allotment for specific project.
Adm PY = Administrative, secreterial person year allotment for specific project.
Intramural PERD = Panel resources spent in house.
Extramural PERD = Panel resources spent on contracts.
G&C = Grants and Contributions.
EC Resources = Regular departmental "A-base" resources.
Other Res = Non PERD $ resources from sources outside the department.

PANEL ON ENERGY RESEARCH & DEVELOPMENT

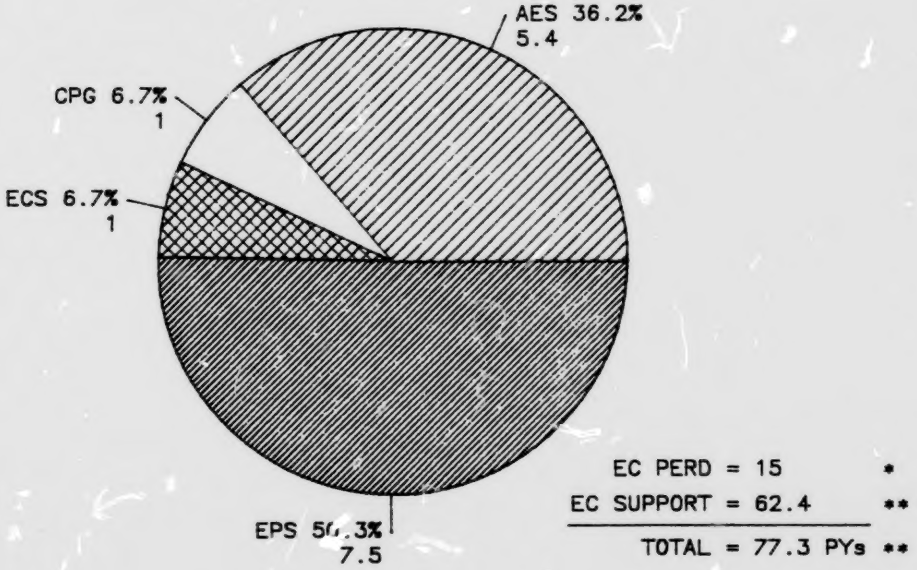
EC 1985-86 PERD AS SPENT RESOURCES BY SERVICE IN K $



* shown in pie chart
** not shown in pie chart

FIGURE 4

EC 1985-86 PERD PERSON-YEAR RESOURCES BY SERVICE



* shown in pie chart
** not shown in pie chart

FIGURE 5

TABLE 2

DEPARTMENT: EC | SUMMARY BY SERVICE AND COORDINATION | PANEL ON ENERGY R&D | july 10, 1987

SERVICE AND TASK	1985-86 PROPOSED PERD		1985-86 AS SPENT K$ AND PY's																									
			INTRAMURAL PERD						EXTRAMURAL PERD				DSS	TOTAL PERD	INTRAMURAL EC RESOURCES						EXTRAMURAL EC RESOURCES				DSS	TOTAL EC	TOTAL OTHER RES	TASK TOTAL	
	K$	PY	O&M	Capital	Sal/Ben	S/T PY	Adm PY	Contract	G&C	Sal/Ben	SA PY	Adm PY	FFES PERD	$	O&M	Capital	Sal/Ben	S/T PY	Adm PY	Contract	G&C	Sal/Ben	SA PY	Adm PY	FFES EC	$	$	K$	PY
AES																													
TASK 2 Oil Sands/Heavy Oil/Coal	118	1.0	8	0	61	1.0	0.0	48	0	0	0.0	0.0	2	118	8	0	0	0.0	0.0	0	0	5	0.1	0.0	0	13	0	131	1.1
TASK 4 Renewables	371	0.0	51	52	8	0.4	0.0	214	0	0	0.0	0.0	7	333	23	0	288	4.6	0.8	4	0	0	0.0	0.0	0	315	4	648	5.8
TASK 6 Oil, Gas, Electricity	2795	4.0	625	235	138	3.3	0.0	1630	0	29	0.7	0.0	32	2688	260	149	1130	24.8	2.7	0	0	23	0.4	0.0	0	1562	309	4249	31.9
Subtotal AES	3284	5.0	684	287	207	4.7	0.0	1892	0	29	0.7	0.0	41	3139	291	149	1418	29.4	3.5	4	0	28	0.5	0.0	0	1890	313	5028	38.8
CPG																													
TASK 2 Oil Sands/Heavy Oil/Coal	92	1.0	19	5	28	0.5	0.0	50	0	28	0.5	0.0	0	130	0	0	8	0.0	0.2	0	0	38	0.5	0.1	0	46	0	176	1.8
Subtotal CPG	92	1.0	19	5	28	0.5	0.0	50	0	28	0.5	0.0	0	130	0	0	8	0.0	0.2	0	0	38	0.5	0.1	0	46	0	176	1.8
ECS																													
TASK 2 Oil Sands/Heavy Oil/Coal	148	1.0	50	0	36	0.8	0.0	62	0	0	0.2	0.0	0	148	0	0	0	0.0	0.0	0	0	0	0.0	0.0	0	0	0	148	1.0
TASK 4 Renewables	150	0.0	6	0	0	0.0	0.0	137	0	0	0.0	0.0	6	148	3	0	14	0.3	0.0	0	0	26	0.6	0.0	0	43	0	191	0.9
TASK 6 Oil, Gas, Electricity	260	0.0	164	83	0	0.0	0.0	6	0	0	0.0	0.0	0	253	28	30	342	6.9	0.0	0	0	15	0.5	0.0	0	415	0	668	7.4
Subtotal ECS	558	1.0	220	83	36	0.8	0.0	205	0	0	0.2	0.0	6	549	31	30	356	7.2	0.0	0	0	41	1.1	0.0	0	458	0	1007	9.3
EPS																													
TASK 1 Conservation	1440	2.0	114	55	122	2.0	0.0	928	0	0	0.0	0.0	25	1243	360	34	308	6.3	0.2	493	0	47	0.9	0.0	0	1241	372	2484	9.4
TASK 2 Oil Sands/Heavy Oil/Coal	1505	3.0	178	51	82	1.8	0.0	565	0	62	1.2	0.0	12	949	44	30	199	4.2	0.0	0	0	62	1.4	0.0	0	335	35	1284	8.6
TASK 4 Renewables	172	0.0	19	0	0	0.0	0.0	133	0	0	0.0	0.0	5	156	0	36	139	3.0	0.0	0	0	23	0.5	0.0	0	198	12	354	3.5
TASK 5 New Liquid Fuels	749	2.0	41	61	37	1.0	0.0	549	0	57	1.0	0.0	21	767	4	5	74	1.3	0.1	0	0	23	0.8	0.0	0	106	230	873	4.2
TASK 6 Oil, Gas, Electricity	457	1.0	52	0	0	0.0	0.0	245	0	29	0.5	0.0	24	348	0	0	0	0.2	0.1	15	0	0	0.9	0.0	1	16	10	364	1.7
Subtotal EPS	4323	8.0	404	167	241	4.8	0.0	2420	0	148	2.7	0.0	87	3463	408	105	720	15.0	0.4	508	0	155	4.5	0.0	1	1896	659	5359	27.4
GRAND TOTAL	8257	15.0	1327	542	512	10.8	0.0	4567	0	205	4.1	0.0	134	7281	730	284	2502	51.6	4.1	512	0	262	6.6	0.1	1	4290	972	11570	77.3

ATMOSPHERIC ENVIRONMENT SERVICE

TABLE 3

DEPARTMENT: FC MYDP PLANNING ELEMENT: AES PANEL ON ENERGY R&D july 10, 1987

INFRD #	TITLE	1985-86 PROPOSED PERD		1985-86 AS SPENT K$ AND PY's																										
				INTRAMURAL PERD					EXTRAMURAL PERD						TOTAL PERD	INTRAMURAL EC RESOURCES					EXTRAMURAL EC RESOURCES						TOTAL EC	TOTAL OTHER	TASK TOTAL	
		K$	PY	O&M	Cap-ital	Sal/Ben	S/T PY	Adm PY	Cont-ract	G&C	Sal/Ben	SA PY	Adm PY	DSS FEES PERD	$	O&M	Cap-ital	Sal/Ben	S/T PY	Adm PY	Cont-ract	G&C	Sal/Ben	SA PY	Adm PY	DSS FEES FC	$	RES $	K$	PY
251031	CARBON DIOXIDE ADVISER	78	1.0	4	0	61	1	0.0	13	0	0	0	0.0	0	78	8	0	0	0	0.0	0	0	0	0	0.0	0	8	0	86	1.0
251061	CO2 FLUX MEASUREMENT	40	0.0	4	0	0	0	0.0	35	0	0	0	0.0	2	40	0	0	0	0	0.0	0	0	5	0	0.0	0	5	0	45	0.1
	Subtotal TASK 2	118	1.0	8	0	61	1.0	0.0	48	0	0	0.0	0.0	2	118	8	0	0	0.0	0.0	0	0	5	0.1	0.0	0	13	0	131	1.1
475011	RESOURCE ASSESSMENT AND DESIGN INFORMATION	277	0.0	29	42	0	0	0.0	180	0	0	0	0.0	7	258	0	0	84	1	0.3	0	0	0	0	0.0	0	84	0	342	1.3
441011	ATMOSPHERIC AERODYNAMICS	99	0.0	22	10	8	0	0.0	34	0	0	0	0.0	0	75	23	0	204	4	0.5	4	0	0	0	0.0	0	231	4	386	4.5
	Subtotal TASK 4	371	0.0	51	52	8	0.4	0.0	214	0	0	0.0	0.0	7	333	23	0	288	4.6	0.8	4	0	0	0.0	0.0	0	315	4	648	5.8
614071	CLIMATIC CHANGE AFFECTING DISCONTINUOUS PERMAFROST	67	0.0	12	0	0	0	0.0	52	0	0	0	0.0	3	67	0	0	13	0	0.0	0	0	6	0	0.0	0	19	0	86	0.4
621041	ENGINEERING DESIGN CRITERIA (EAST COAST)	51	0.5	5	0	12	0	0.0	52	0	8	0	0.0	1	79	65	0	52	1	0.4	0	0	0	0	0.0	0	117	31	196	1.6
621091	ENGINEERING DESIGN CRITERIA (ARCTIC)	177	1.0	12	15	21	1	0.0	89	0	21	1	0.0	4	161	50	0	6	0	0.0	0	0	0	0	0.0	0	56	31	218	1.1
621151	ENGINEERING DESIGN CRITERIA (PACIFIC)	85	0.0	17	0	0	0	0.0	74	0	0	0	0.0	5	95	35	0	23	1	0.1	0	0	12	0	0.0	0	70	0	165	0.8
671011	MARINE WEATHER FORECAST EAST COAST	135	0.0	0	0	0	0	0.0	176	0	0	0	0.0	3	179	0	0	49	1	0.0	0	0	0	0	0.0	0	49	0	227	1.0

TABLE 3 CONT'D

DEPARTMENT: EC　　　MYOP PLANNING ELEMENT: AES　　　PANEL ON ENERGY R&D　　　july 10, 1987

INFRO #	TITLE	1985-86 PROPOSED PERD		1985-86 AS SPENT K$ AND PY's																								
				INTRAMURAL PERD					EXTRAMURAL PERD					DSS FFES PERD	TOTAL PERD	INTRAMURAL EC RESOURCES					EXTRAMURAL EC RESOURCES					DSS FFES EC	TOTAL EC	TOTAL OTHER RES	TASK TOTAL	
		K$	PY	O&M	Cap-ital	Sal/Ben	S/T PY	Adm PY	Cont-ract	G&C	Sal/Ben	SA PY	Adm PY		$	O&M	Cap-ital	Sal/Ben	S/T PY	Adm PY	Cont-ract	G&C	Sal/Ben	SA PY	Adm PY		$	$	K$	PY
671041	WAVES AND SEA STATE PREDICTION	278	1.5	0	0	65	2	0.0	207	0	0	0	0.0	3	276	0	49	1	0	0.0	0	0	0	0	0.0	0	50	47	325	1.5
671151	ICE PREDICTION IN REAL TIME MODELS	105	0.0	0	0	0	0	0.0	75	0	0	0	0.0	2	76	0	0	49	1	0.9	0	0	0	0	0.0	0	49	0	125	1.0
671161	SATELLITE RADAR INFOR. FOR ICE FORCASTING	50	0.0	0	0	0	0	0.0	23	0	0	0	0.0	0	28	10	0	75	1	0.1	0	0	0	0	0.0	0	85	0	113	1.0
671181	SATELLITE COMMUNICATIONS	150	0.0	0	0	0	0	0.0	150	0	0	0	0.0	0	150	0	0	0	0	0.0	0	0	0	0	0.0	0	0	0	150	0.0
671221	INTEGRATED ICE RECCE SYSTEM	445	0.0	0	0	0	0	0.0	363	0	0	0	0.0	1	364	0	0	5	0	0.0	0	0	0	0	0.0	0	5	0	369	0.1
671261	PREDICTION OF OIL SPILL MOVEMENT IN ICE LADEN WATERS	90	0.0	0	0	0	0	0.0	0	0	0	0	0.0	0	0	0	0	0	0	0.0	0	0	0	0	0.0	0	0	0	0	0.1
671351	ATLANTIC STORMS	987	1.0	565	2[illegible]5	40	1	0.0	355	0	0	0	0.0	10	1190	100	100	850	20	2.0	0	0	0	0	0.0	0	1050	200	2240	23.0
672191	LNG SPILL CONTROL	100	0.0	1	6	0	0	0.0	0	0	0	0	0.0	0	1	0	0	0	0	0.0	0	0	5	0	0.0	0	5	0	6	0.1
682031	ICE AND WIND ON TRANSMISSION LINES	75	0.0	13	0	0	0	0.0	9	0	0	0	0.0	0	22	0	0	7	0	0.1	0	0	0	0	0.0	0	7	0	29	0.2
	Subtotal TASK 6	2795	4.0	625	235	138	3.3	0.0	1630	0	29	0.7	0.0	32	2688	260	149	1130	24.8	2.7	0	0	23	0.4	0.0	0	1562	309	4249	31.9

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: CARBON DIOXIDE ADVISER　　OERD Project Number: 25103

2. Manager: H.G. HENGEVELD　　Department EC/AES
Address: ATMOSPHERIC ENVIRONMENT SERVICE　　Phone Number: (416) 667-4525
4905 DUFFERIN STREET
DOWNSVIEW, ONTARIO M3H 5T4

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	78.00	1.0
PERD As spent	78.00	1.0
EC As spent	7.90	0.0
Other As spent	0.00	0.0
Total As spent	85.90	1.0

4. Contractor(s): 1) A. LEEWAH
104 HALLAM ST.
TORONTO, ONT. M6H 1W8
2) W. MACDONALD
72 BELLEVUE AVE.
TORONTO, ONTARIO M5T 2N7

5. 85-86 Objectives:
as for 84/85

6. Accomplishments/Milestones Achieved:
- visits to 8 European CO2/climate research centres
- review and cataloguing of 325 scientific articles and reports
- preparation and dissemination of three issues of "CO2/Climate Report" newsletter and the 1985 annual report " Understanding CO2 and Climate" (mailing list of 800)
- presentation of 5 seminars; response to 76 requests for information; 5 media interviews

7. Problems Encountered/Resolution?
None

8. Publications/Reports in 85-86 or in Press:
"Understanding CO2 and Climate" - Annual Report 1985
"CO2/Climate Report" (Spring 1985, Summer 1985, Winter 1986)
"Intercomparison of Climate Change Scenarios" (contract report)

9. Recommendations:
Program continuation
CO2 Emission/Energy Options Workshop

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: CARBON DIOXIDE ADVISER OERD Project Number: 25103

2. Department/Service: EC/AES
3. Proposed PERD Resources K$ (PY): 78.00 (1.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY) Sci./Tech.	(PY) Admin.	Contract	Contribution	Sal.& Ben.	(PY) Sci./Auth.	(PY) Admin.	Fees Paid
4.10	0.00	61.0	1.0	0.0	12.50	0.00	0.00	0.0	0.0	0.40

Total Panel K$ (PY): 78.00 (1.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY) Sci./Tech.	(PY) Admin.	Contract	Contribution	Sal.& Ben.	(PY) Sci./Auth.	(PY) Admin.	Fees Paid
7.90	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.00

Total EC K$ (PY) = 7.90 (0.0)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 0.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: CO2 FLUX MEASUREMENT OERD Project Number: 25106

2. Manager: N. TRIVETT Department EC/AES
Address: DOWNSVIEW, ONTARIO Phone Number: (613) 667-4954

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	40.00	0.0
PERD As spent	40.00	0.0
EC As spent	5.00	0.1
Other As spent	0.00	0.0
Total As spent	45.00	0.1

4. Contractor(s): DR. K. KING/UNIVERSITY OF GUELPH
MR. D. ERNST/TORONTO

5. 85-86 Objectives:
1. to evaluate gradient and simpler "scale-length" models for flux measurements at a point in space
2. to intercompare sonic anemometers for use in flux measurements

6. Accomplishments/Milestones Achieved:
The flux gradient and scale length models were intercompared over alfalfa at the University of Guelph Research Farm. Both models agreed well during daylight hours only. The response characterisitcs of the sonic anemometer were thoroughly evaluated in the AES wind tunnel and intercompared in the field.

7. Problems Encountered/Resolution?
Scale-length model did not work under stable night time conditions over relatively smooth surfaces. This problem will be investigated further by simultaneous measurements over corn and alfalfa.

8. Publications/Reports in 85-86 or in Press:
1. Contract report - Evaluation of University of Guelph simulation model for estimating fluxes.
2. Contract report - Sonic Anemometer Calibrations.

9. Recommendations:
Further testing of simulation model both at Univ. of Guelph, in Manitoba over wheat (in conjuction with Agric Canada) and at AES site in Borden over forest.

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: CO2 FLUX MEASUREMENT OERD Project Number: 25106

2. Department/Service: EC/AES
3. Proposed PERD Resources K$ (PY): 40.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contrib-ution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
3.70	0.00	0.0	0.0	0.0	34.50	0.00	0.00	0.0	0.0	1.80

Total Panel K$ (PY): 40.00 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contrib-ution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	0.00	0.00	5.00	0.1	0.0	0.00

Total EC K$ (PY) = 5.00 (0.1)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 0.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: RESOURCE ASSESSMENT AND DESIGN INFORMATION
OERD Project Number: 42501
2. Manager: S. LAPCZAK/A.CHISHOLM
Department EC/AES
Address: ATMOSPHERIC ENVIRONMENT SERVICE
4905 DUFFERIN ST.
DOWNSVIEW, ONT. M3H 5T4
Phone Number: (416) 667-4826

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	272.00	0.0
PERD As spent	257.60	0.0
EC As spent	84.00	1.3
Other As spent	0.00	0.0
Total As spent	341.60	1.3

4. Contractor(s):
1. UNIVERSITY OF B.C.
VANCOUVER, B.C.
2. MCMASTER UNIVERSITY
HAMILTON, ONTARIO
3. PHD. ASSOCIATES,
DOWNSVIEW, ONTARIO
4. UNIVERSITY OF TORONTO
TORONTO, ONTARIO

5. 85-86 Objectives:
-continue IEA Task XI (Solar Radiation and Pyranometry Studies) work
-produce final draft of Solar Radiation Monograph publication - a description of solar radiation, its physical nature, measurement and Canadian climatology with applications to solar energy.

6. Accomplishments/Milestones Achieved:
-Good progress on Validation of Solar Models and Pyranometry Subtasks ; the completion dates are now scheduled for December 1986 and June 1987, respectively.

7. Problems Encountered/Resolution?
-publication of Solar Radiation Monograph delayed until 86/87

8. Publications/Reports in 85-86 or in Press:
McKay, D.C. and R.J. Morris, 1985: Solar Radiation Data Analyses for Canada 1967-1976 (6 regional volumes). Atmospheric Environment Service. Downsview, Ontario, 1985
Wardle, D.I. and D.C. McKay, 1986: Proceedings of the 1984 IEA Symposium, Recent Advances in Pranometry. Atmospheric Environment Service, Downsview, Ontario, 1986.

9. Recommendations:

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: RESOURCE ASSESSMENT AND DESIGN INFORMATION   OERD Project Number: 42501
2. Department/Service: EC/AES
3. Proposed PERD Resources K$ (PY): 272.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
29.40	42.00	0.0	0.0	0.0	179.50	0.00	0.00	0.0	0.0	6.70

Total Panel K$ (PY): 257.60 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	84.0	1.0	0.3	0.00	0.00	0.00	0.0	0.0	0.00

Total EC K$ (PY) = 84.00 (1.3)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 0.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: ATMOSPHERIC AERODYNAMICS OERD Project Number: 44101

2. Manager: S. LAPCZAK/H. Allard Department EC/AES
Address: ATMOSPHERIC ENVIRONMENT SERVICE Phone Number: (416) 667-4808
4905 DUFFERIN ST.
DOWNSVIEW, ONT M3H 5T4

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	99.00	0.0
PERD As spent	74.70	0.4
EC As spent	231.00	4.1
Other As spent	4.00	0.5
Total As spent	309.70	5.0

4. Contractor(s):
1. RESOURCE VENTURES INC.
CHARLOTTETOWN, P.E.I.
2. J.R. SALMON
TORONTO, ONTARIO
3. THERMAL SCIENCES,
WATERLOO, ONARIO
4. PLESSEY PERIPHRAL SYSTEMS
MISSISSAUGA, ONTARIO

5. 85-86 Objectives:
-publish a series of specialized wind energy analyses for 144 sites in Canada; complete field test of anemometers; implement model on microcomputer for wind flow in complex terrain; complete Askervein '83 report; prepare journal articles on Kettles Hill and Askervein data; investigate methods of fitting Weibull distribution to observed wind speed data.

6. Accomplishments/Milestones Achieved:
-Askervein '83 report completed and submitted to IEA R&D WECS as completion of Task VI
-developed MSFD of flow over complex terrain and applied to limited Askervein data sets
-completed report on 1:2500 wind tunnel Askervein flow study
-anemometer field test completed; draft final report in hand
-transportable version of MS3DJH model with user guide completed
-work completed on Weibull distributions.

7. Problems Encountered/Resolution?
-The Wind Energy books, MS3DJH model and Kettles Hill and Askervein journal papers were delayed until FY 86/87 due to; staff shortages, contractor other OERD tasks and the pressure of other commitments, respectively.

8. Publications/Reports in 85-86 or in Press:

Beljaars, A.C.M., J.L. Walmsley and P.A. Taylor (1986): A Mixed Spectral Finite Difference Model for Neutrally Stratified Boundary Layer flow Over Roughness Changes and Topography. (to be submitted to Boundary Layer Meteorology in April 1986).

Bowen, A.J. and Teunissen, H.W. (1986): The Askervein Hill Experiment : Wind Tunnel Simulation at length scale 1:2500. EAS Research Report MSRB-86-AES (in press)

Morris, R.J. (1985): Evaluation of methods of fitting the Weibull distribution to observed wind speed distributions for wind energy applications. Proc. 1st Annual Canadain Wind Energy conference, held at Ottawa, Ontario. December 9-10, 1985.

Salmon, J.R. and J.L. Waslmsley, 1986: User's Guide to the MS3DJH/3R Model. Report 86-I-2 Atmospheric Environment Service, Downsview, Ontario, 46pp.

Taylor, P.A., P.J. Mason and E.F. Bradley, 1985: Boundary Layer Flow over Hills - A Review of Recent Field Experiments. Extended Abstracts, 7th AMS Symposium on Turbulence and Diffusion. Boulder, Colorado, Nov. 1985.

Taylor, P.A. and Teunissen, H.W. (1985): The Askervein Hill Project: Report on the September/October 1983 Main Field Experiment. report MSRB-84-6, Atmoshperic Environment Service, Downsview, Ontario, December, 1985.

Taylor, P.A., J.L. Walmsley and J.R. Salmon 1985: Guidelines and Models for Estimating Wind speeds at WECS Sites in Complex Terrain. Proc. INTERSOL '85 Conf., Montreal, June, 1985

9. Recommendations:

Extension of this and related work through 89/90.

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: ATMOSPHERIC AERODYNAMICS OERD Project Number: 44101

2. Department/Service: EC/AES
3. Proposed PERD Resources K$ (PY): 99.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY) Sci./Tech.	(PY) Admin.	Contract	Contribution	Sal.& Ben.	(PY) Sci./Auth.	(PY) Admin.	Fees Paid
22.00	10.00	8.4	0.4	0.0	34.00	0.00	0.00	0.0	0.0	0.30

Total Panel K$ (PY): 74.70 (0.4)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY) Sci./Tech.	(PY) Admin.	Contract	Contribution	Sal.& Ben.	(PY) Sci./Auth.	(PY) Admin.	Fees Paid
22.90	0.00	204.1	3.6	0.5	4.00	0.00	0.00	0.0	0.0	0.00

Total EC K$ (PY) = 231.00 (4.1)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
NRC FE	4.00	0.00	0.0	0.00	0.5

Total Other K$ (PY) = 4.00 (0.5)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: CLIMATIC CHANGE AFFECTING DISCONTINUOUS PERMAFROST
OERD Project Number: 61407
2. Manager: M.O. BERRY
Department EC/AES
Address: CHIEF, APLLICATION AND IMPACT DIV.
ATMOSPHERIC ENVIRONMENT SERCICE
4905 DUFFERIN ST., M3H 5T4
Phone Number: (416) 667-4624

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	67.00	0.0
PERD As spent	67.00	0.0
EC As spent	18.70	0.4
Other As spent	0.00	0.0
Total As spent	85.70	0.4

4. Contractor(s):

H. GRANBERG
120 REGENT RD.
GREENFIELD PARK, QUE.
J4V 2T9

KEL RESEARCH CORP.
850-A ALNESS ST., SUITE 9
DOWNSVIEW, ONT. M3J 2H5

M.W. SMITH
DEPT. OF GEOGRAPHY
CARLETON UNIVERSITY
OTTAWA, ONT. K1S 5B6

W. MACDONALD
72 BELLEVUE AVE.
TORONTO, ONT. M5T 2N7

5. 85-86 Objectives:
To monitor and evaluate permafrost-climate relationships with the intent of assessing the impacts of possible future climate change on the Canadian permafrost regime.

6. Accomplishments/Milestones Achieved:
1) Monitoring stations installed at Churchill, Man. and Mayo, Yukon.
2) Software developed to analyze and display station data.
3) Report on permafrost-climate areal relationships completed.

7. Problems Encountered/Resolution?
Difficulties with some sensors and station configuration, particularly at Norman Wells and Churchill, resulted in some loss of data during the year. These problems will be rectified during FY 1986-87.

8. Publications/Reports in 85-86 or in Press:
1) The Development of a Spatial Permafrost Model for Northern Canada and its Application to Scenarios of Climate Change (1986). Contract report prepared for AES by Kel Research.
2) Instrumentation for Long-Term Monitoring of Permafrost Temperatures, in Relation to Climatic Change, near Mayo, Yukon (1986). Contract report on Mayo installation prepared for EAS by M.W. Smith.
3) Equipment Installation for Permafrost Climate Project at Churchill, Manitoba (1986). Report on Churchill installation prepared for AES.

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: CLIMATIC CHANGE AFFECTING DISCONTINUOUS PERMAFROST   OERD Project Number: 61407
2. Department/Service: EC/AES
3. Proposed PERD Resources K$ (PY): 67.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
12.30	0.00	0.0	0.0	0.0	52.10	0.00	0.00	0.0	0.0	2.60

Total Panel K$ (PY): 67.00 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	13.0	0.3	0.0	0.00	0.00	5.70	0.1	0.0	0.00

Total EC K$ (PY) = 18.70 (0.4)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 0.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: ENGINEERING DESIGN CRITERIA (EAST COAST) OERD Project Number: 62104
2. Manager: S.LAPCZAK (A. SAULESLEJA) Department EC/AES
Address: 4905 DUFFERIN ST. Phone Number: (416) 667-4618
DOWNSVIEW, ONT.
M3H 5T4

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	51.00	0.5
PERD As spent	78.60	0.5
EC As spent	117.10	1.1
Other As spent	30.50	0.0
Total As spent	226.20	1.6

4. Contractor(s): -MACLAREN PLANSEARCH, HALIFAX, N.S.
-SEACONSULT LIMITED, ST. JOHN'S, NFLD.

5. 85-86 Objectives:
-to develop new methodologies to infer climate design parameters such as marine winds, design storms and marine icing
-to develop climate information systems and data bases required for marine climate design statistics

6. Accomplishments/Milestones Achieved:
-implemented global marine data base
-completed comparative climatology of world offshore exploration areas
-field measurements of icing during CASP
-held international workshop on offshore winds and icing, attended by government and industry, in Halifax N.S.

7. Problems Encountered/Resolution?
none

8. Publications/Reports in 85-86 or in Press:
-Proceedings International Workshop On Offshore Winds and Icing
-Description of Meteorological and Oceanographic Conditions Associated with Typical Storms on the East Coast of Canada
-Climate Information Systems Technical Manual
-Comparative Climatology of World Offshore Exploration Areas

9. Recommendations:
-Analysis of exisiting data bases-produce summary report
-Response to rec's of Int'l Workshop on Offshore Winds and Icing

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: ENGINEERING DESIGN CRITERIA (EAST COAST) OERD Project Number: 62104
2. Department/Service: EC/AES
3. Proposed PERD Resources K$ (PY): 51.00 (0.5)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contrib-ution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
4.70	0.00	12.4	0.3	0.0	52.00	0.00	8.30	0.2	0.0	1.20

Total Panel K$ (PY): 78.60 (0.5)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contrib-ution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
64.70	0.00	52.4	0.7	0.4	0.00	0.00	0.00	0.0	0.0	0.00

Total EC K$ (PY) = 117.10 (1.1)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
Arctic Marine R&D	30.50	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 30.50 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: ENGINEERING DESIGN CRITERIA (ARCTIC) OERD Project Number: 62109
2. Manager: P.J. PERNDER, A/DIRECTOR GENERAL Department EC/AES

Address: CANADIAN CLIMATE CENTRE. Phone Number: (416) 667-4550
ATMOSPHERIC ENVIRONMENT SERVICE.
4905 DUFFERIN ST., DOWNSVIEW, ONT.

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	177.00	1.0
PERD As spent	161.30	1.0
EC As spent	56.30	0.1
Other As spent	30.50	0.0
Total As spent	248.10	1.1

4. Contractor(s):

THE MEP COMPANY,
MARKHAM, ONT.
WYATT MACDONALD
TORONTO, ONT.
CANADA SYSTEMS GROUP
MISSISSAUGA, ONT.

CONCORD SCIENTIFIC
DOWNSVIEW, ONT.
B. INKSTER
CALGARY, ALTA.

5. 85-86 Objectives:

To develop methods to provide integrated and accurate marine climatologies to meet offshore arctic engineering design needs and support government regulatory agencies.

6. Accomplishments/Milestones Achieved:

- Organization of the first International Offshore Winds and Icing Workshop held October 7-11, 1985, in Halifax.
- Collection of a global and several regional sea ice data bases and the development of a climate information system for sea ice (CRISP). It is well recognized that sea ice is the main concern of the oil operators in the Beaufort Sea.
- The collection and evaluation of other non-standard climate data sets (Panarctic, Dome, Polar Shelf). These data are now available through MAST.
- A study of climate variability and climate change looking at possible climate warming using analog and regression techniques was done.
- Completion of the Hudson Bay-Foxe Basin Severe Storm Catalogue.

7. Problems Encountered/Resolution?

- work on SPASM has been delayed due to slow return of and unavailability of contractor until FY 86/87.

8. Publications/Reports in 85-86 or in Press:

1. Brown, R.D. and Agnew, T.A. (1985), Characteristics of Marine Icing in Canadian waters, Proc. of the International Workshop on Winds and Icing

October 7-11, 1985, Halifax.

2. Brown, R.D. and Agnew, T.A. (1985), Evaluation of Currently Available Marine Icing on Ships and Offshore Structures, Proc. of the International Workshop on Winds and Icing, October 7-11, 1985, Halifax.
3. Lewis, P.J. (1986). Severe Storms over Hudson Bay-Foxe Basin: A Catalogue Summary For the Period 1957 to 1983, to be published as a CCC Report.
4. Proceeding International Workshop on Offshore Winds and Icing, Halifax, N.S. October 7-11, 1985. Editors T.A. agnew and V.R. Swail, published by Environment Canada. Atmospheric Environment Service.
5. Evaluation of Existing Climatologies for the Beaufort Sea, (1986), prepared by The MEP Company for Environment Canada, AES.
6. Canadian Seasonal Climate Senarios for a CO2-Induced Global Warming, prepared by the MEP Company for Environment Canada, AES.
7. Etkin, D. and W. MacDonald (1986): Annual and Seasonal Climate Scenarios for a Warmer Arctic. CCC Report 86-1, AES, Downsview.

9. Recommendations:

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: ENGINEERING DESIGN CRITERIA (ARCTIC) OERD Project Number: 62109
2. Department/Service: EC/AES
3. Proposed PERD Resources K$ (PY): 177.00 (1.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY) Sci./Tech.	(PY) Admin.	Contract	Contrib-ution	Sal.& Ben.	(PY) Sci./Auth.	(PY) Admin.	Fees Paid
11.60	15.00	20.7	0.5	0.0	89.00	0.00	20.60	0.5	0.0	4.40

Total Panel K$ (PY): 161.30 (1.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY) Sci./Tech.	(PY) Admin.	Contract	Contrib-ution	Sal.& Ben.	(PY) Sci./Auth.	(PY) Admin.	Fees Paid
50.00	0.00	6.3	0.1	0.0	0.00	0.00	0.00	0.0	0.0	0.00

Total EC K$ (PY) = 56.30 (0.1)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
Arctic Marine Transport	30.50	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 30.50 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: ENGINEERING DESIGN CRITERIA (PACIFIC)   OERD Project Number: 62115

2. Manager: S. LAPCZAK (A. SAULESLEJA)   Department EC/AES
Address: 4905 DUFFERIN STREET   Phone Number: (416) 667-4618
DOWNSVIEW, ONT.
M3H 5T4

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	85.00	0.0
PERD As spent	95.40	0.0
EC As spent	70.00	0.8
Other As spent	0.00	0.0
Total As spent	165.40	0.8

4. Contractor(s):
-CANADA SYSTEMS GROUP, MEADOWVALE, ONT.
-ATMOSPHERIC SCIENCES LTD., VACOUVER, B.C.
-MEP COMPANY, MARKHAM, ONT.

5. 85-86 Objectives:
-to develop new methodologies to infer climate design parameters such as marine winds, design storms and marine icing.
-to develop climate information systems and data bases required for marine climate design statistics

6. Accomplishments/Milestones Achieved:
- completed west coast marine environmental atlas
- carried out field measurements of icing at Green Island, B.C.
- completed interannual variability study of marine climate
- completed study of extreme value analysis for environmental parameters

7. Problems Encountered/Resolution?
none

8. Publications/Reports in 85-86 or in Press:
- Marine Climatological Atlas - Canadian west Coast
- Review and Assessment of Extreme Value analysis Procedures (3 parts)
- Interannual Variability of Marine Climate

9. Recommendations:
-undertake a program of studies to respond to the recommendations of the International Workshop on Offshore Winds and Icing, held in Halifax, N.S. in 1985.

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: ENGINEERING DESIGN CRITERIA (PACIFIC) OERD Project Number: 62115
2. Department/Service: EC/AES
3. Proposed PERD Resources K$ (PY): 85.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
16.70	0.00	0.0	0.0	0.0	73.80	0.00	0.00	0.0	0.0	4.90

Total Panel K$ (PY): 95.40 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
35.00	0.00	23.4	0.5	0.1	0.00	0.00	11.60	0.2	0.0	0.00

Total EC K$ (PY) = 70.00 (0.8)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 0.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: MARINE WEATHER FORECAST EAST COAST — OERD Project Number: 67101
2. Manager: H. ALLARD — Department EC/AES
Address: DOWNSVIEW — Phone Number: (416) 667-4808

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	135.00	0.0
PERD As spent	178.70	0.0
EC As spent	48.60	1.0
Other As spent	0.00	0.0
Total As spent	227.30	1.0

4. Contractor(s): ACRES INTERNATIONAL INC., NIAGARA FALLS, ONT.
COGNI-COM INC., MOTREAL, QUEBEC.

5. 85-86 Objectives:
1) Statistical marine wind forecasts for West Coast
2) statistical marine visibility forecasts for East Coast and Beaufort Sea
3) Report on evaluation of statistical forecasts supporting CASP
4) Report on test of artificial intelligence methods for generating computer-worded marine forecasts.

6. Accomplishments/Milestones Achieved:
- Testing of ship winds vs. buoy winds for development of marine surface wind forecast procedures. Result: Buoy winds give better fit, ship winds more plentiful.
- Testing of sensitivity of statistical marine wind forecast techniques to sample size.
- Experiments with marine visibility forecasting techniques - technique abandoned due to poor quality of data.
- Demonstration of operating systems for computer worded marine forecasts.

7. Problems Encountered/Resolution?
$135 K requested for 85/86 and $105 K was allocated.
A $55 K contract slipped from 1984/85 FY into 1985/86.

8. Publications/Reports in 85-86 or in Press:
1. Acres International: "Maine Weather Forecasting for the West Coast, Final Report."
2. Acres International: "Wind Forecasting Techniques Using Buoy and Ship Winds."
3. Cognicom, Inc.: "A Study on the Application of Artificial Intelligence Techniques to Weather Forecast Generation."

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: MARINE WEATHER FORECAST EAST COAST OERD Project Number: 67101
2. Department/Service: EC/AES
3. Proposed PERD Resources K$ (PY): 135.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contrib-ution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	176.20	0.00	0.00	0.0	0.0	2.50

Total Panel K$ (PY): 178.70 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contrib-ution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	48.6	1.0	0.0	0.00	0.00	0.00	0.0	0.0	0.00

Total EC K$ (PY) = 48.60 (1.0)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 0.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: WAVES AND SEA STATE PREDICTION   OERD Project Number: 67104

2. Manager: H. ALLARD   Department EC/AES
Address: DOWNSVIEW   Phone Number: (416) 667-4808

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	278.00	1.5
PERD As spent	275.50	1.5
EC As spent	49.60	0.0
Other As spent	47.30	0.5
Total As spent	372.40	2.0

4. Contractor(s): MACLAREN PLANSEARCH LTD., HALIFAX, NOVA SCOTIA
MACLAREN PLANSEARCH LTD., HALIFAX, NOVA SCOTIA
NATIONAL WATER RESEARCH INSTITUTE, IWD, EC, BURLINGTON, ONT.
ATMOSPHERIC DYNAMICS CORP., VICTORIA, B.C.
NORDCO LTD., ST. JOHN'S NEWFOUNDLAND

5. 85-86 Objectives:
-Report on; evaluation of SOWM wave model, shallow water wave study (with CCIW) and Beaufort Sea application of Donelan Wave Model
-Assembly of freezing spray data for model validation
-Application of storm surge, shallow water wave, freezing spray, ocean wave models during CASP

6. Accomplishments/Milestones Achieved:
-Two spectral wave models, the Sowm and the ODGP (Ocean Data Gathering Program) were evaluated for selected storm cases over the Canadian Atlantic. It was found that the ODGP model provided better wave products than the SOWM in a diagnostic as well as prognostic mode.
-Based on evaluation at selected rig locations on the Canadian east coast it was found that CMC winds tend to overestimate storm winds with larger time lag
-Spectral wave model ADWAVE (Arbitrary Depth WAVE) tested in operational mode
-Carried out field study of aspects of wave dissipation and fetch-limited short wave growth in shallow waters of Lake St. Clair.
-Modified storm surge model to include effects of Bay of Fundy-Gulf of Maine.
-Converted lakewave model to run for the Beaufort Sea.
-Ran storm surge, freezing spray and ocean wave models in real-time during Canadian Atlantic Storms Project. Provided forecasts to CASP forecast desk.
-The Ocean wave model was made operational in November, 1985. Forecasts are provided twice a day for the North West Atlantic and North East Pacific and are used by AES and Department of National Defence forecast offices.

7. Problems Encountered/Resolution?
$301 K requested for project, $200.8 K allocated
- no freezing spray data was collected.

8. Publications/Reports in 85-86 or in Press:

1. Two MacLaren Plansearch Reports:
    - a. Evaluation of the Spectral Ocean Wave Model (SOWM) for supporting real-time wave forecasting in the Canadian east coast offshore, 159 p. + 5 Appendicies, January, 1985.
    - b. Further evaluation of the Spectral Ocean Wave Model (SOWM) for supporting real-time wave forecasting in the Canadian east coast offshore, 98 p. + 2 Appendicies, Auguest, 1985.
2. A paper 'Wind specificaion for spectral ocean wave models' by M.L. Khandekar and B.M. Eid, to be presented at the 20th International Conference on Coastal Engineering in Taiwan, November, 1986.
3. A brief report on the field study is available. Detailed report on data analysis will be prepared at a later date.
4. Contract report "Modifications to the AES storm surge model for the Nova Scotia Shelf", March, 1986.
5. A draft of the final contract report " Forecasting Beaufort Sea wind waves by a momentum balance method".
6. An internal AES report "A Review of Meteorological Services Research Branch Activites in the Canadian Atlantic Storms Project" by K. Macdonald.

9. Recommendations:
Project should continue as proposed.

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: WAVES AND SEA STATE PREDICTION OERD Project Number: 67104

2. Department/Service: EC/AES
3. Proposed PERD Resources K$ (PY): 278.00 (1.5)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	65.0	1.5	0.0	207.10	0.00	0.00	0.0	0.0	3.40

Total Panel K$ (PY): 275.50 (1.5)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	48.60	1.0	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.00

Total EC K$ (PY) = 49.60 (0.0)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
Northern Oil & Gas Action	23.00	0.00	24.3	0.00	0.5

Total Other K$ (PY) = 47.30 (0.5)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: ICE PREDICTION IN REAL TIME MODELS — OERD Project Number: 67115
2. Manager: H. ALLARD — Department EC/AES
Address: DOWNSVIEW — Phone Number: (416) 667-4808

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	105.00	0.0
PERD As spent	76.20	0.0
EC As spent	48.60	1.0
Other As spent	0.00	0.0
Total As spent	124.80	1.0

4. Contractor(s):
1. Iceberg drift model - FENCO Newfoundland Ltd. St. John's Nfld.
2. Micromechanics approach to sea ice modelling - Quadra Dynamics Inc., Montreal, P.Q.
3. Remote sensed data in ice models - University of Waterloo Research Institute, Waterloo, Ont.

5. 85-86 Objectives:
-Report on testing the iceberg drift model
-Report on Phase II of ice modelling using a micromechanical appproach
-Ice initialization procedures based on remotely sensed data developed

6. Accomplishments/Milestones Achieved:
1) The AES iceberg ensembles drift model was evaluated with observed data. A paper on the subject was [presented at the 5th International Symposium on Offshore mechanics and Arctic Engineering (OMAE) with subsequent publication in the Journal of OMAE and Energy Resources.
2) Significant progress was made on the micro-mechanics approach to sea ice dynamics modelling.
3) Very good progress has been made in automatically extracting ice information from radar imagery (SLAR/SAR). As a result of this contract UWRI has obtained a 3-year NSERC grant to pursue the research.

7. Problems Encountered/Resolution?
$105 K requested, $115.4 K allocated in Work Plans.

8. Publications/Reports in 85-86 or in Press:
1) Contract report - "Further improvements to the AES iceberg ensembles drift model", October, 1985.
M. EL-Tahan, S.Venkatesh and H. EL-Tehan: "Evaluation of a model for predicting the drift of iceberg ensembles", Proc. 5th Int'l Symp. on OMAE, TOkyo, Japan, April 13-18, 1986.

2) Contract report - "A stochastic micromechanics model of the ice fields", October, 1985.
   M. Ostoja-Starzewski, R.G. Jessup and S. Venkatesh: "Micromechanics approach to sea ice dynamics", Proc., Canadian east coast workshop on sea ice, Halifax, Jan. 7-9, 1986.
3) Contract report - "Use of radar imagery for the estimation of ice strength and drag coefficient", In press.

9. Recommendations:
-Funding scheduled to stop after 1986/87 FY. Other funding expected from the Arctic Marine Transportation Program but renewal for 86/87 to 89/90 uncertain.

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: ICE PREDICTION IN REAL TIME MODELS OERD Project Number: 67115
2. Department/Service: EC/AES
3. Proposed PERD Resources K$ (PY): 105.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	74.70	0.00	0.00	0.0	0.0	1.50

Total Panel K$ (PY): 76.20 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	48.6	1.0	0.0	0.00	0.00	0.00	0.0	0.0	0.00

Total EC K$ (PY) = 48.60 (1.0)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 0.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: SATELLITE RADAR INFOR. FOR ICE FORCASTING
OERD Project Number: 67116
2. Manager: JOHN C. FALKINGHAM
Department EC/AES
Address: ICE CENTRE ENVIRONMENT CANADA
Phone Number: (613) 996-0001

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	50.00	0.0
PERD As spent	28.10	0.0
EC As spent	85.00	1.0
Other As spent	0.00	0.0
Total As spent	113.10	1.0

4. Contractor(s):

5. 85-86 Objectives: Continue studies on satellite and aircraft radar image analysis procedures suitable for operational use in the analysis of sea ice conditions. Issue report on recommended procedures for the Ice Centre.

6. Accomplishments/Milestones Achieved:
The publications listed below were as a result of continued studies using the ARIES-II image analysis system purchased in 1984. In addition, this work was used to specify image analysis requirements for the Ice Data Integration and Analysis System (IDIAS) which is the operational system to be built to make use of satellite radar data.

7. Problems Encountered/Resolution?
Alteration and delay of the Expanded Ice Information Services Program, which provides major portion of funding for IDIAS, resulted in slow down of development work. $22K of PERD funding was transferred from this project to another AES PERD project for payback in future years in order to accomodate this delay

8. Publications/Reports in 85-86 or in Press:
1. Ice Data Integration and Analysis System - Requirements Specification; MacDonald, Dettwiler and Associates Ltd.; July 1985 (this project contributed to this document).
2. ICEC Radar Imagery Analysis Project - Final Report; DMR & Assoc. Ltd.; November 1985
3. Performance Evaluation of Task NCT and Preliminary Appraisal of UBC Image Navigation Package; Dean Flett; May 1986.
4. NOAA AVHRR Image Analysis Project - Final Report; Michael Zieger; November 1985.

9. Recommendations:
The project should continue to be funded at the level and cash flow previously

identified if the entire project is to succeed.

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: SATELLITE RADAR INFOR. FOR ICE FORCASTING   OERD Project Number: 67116
2. Department/Service: EC/AES
3. Proposed PERD Resources K$ (PY): 50.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contrib-ution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	28.10	0.00	0.00	0.0	0.0	0.00

Total Panel K$ (PY): 28.10 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contrib-ution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
10.00	0.00	75.0	0.9	0.1	0.00	0.00	0.00	0.0	0.0	0.00

Total EC K$ (PY) = 85.00 (1.0)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 0.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: SATELLITE COMMUNICATIONS OERD Project Number: 67118

2. Manager: D. H. Champ Department EC/AES
Address: 4905 Dufferin Street
Downsview, Ontario M3H 5T4
Phone Number: (416) 472-7000

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	150.00	0.0
PERD As spent	150.00	0.0
EC As spent	0.00	0.0
Other As spent	0.00	0.0
Total As spent	150.00	0.0

4. Contractor(s): MILLER COMMUNICATIONS SYSTEMS
300 LEGGETT DRIVE
KANATA, ONTARIO

5. 85-86 Objectives:
-Carry out installation of all the equipment and commence testing to verify operation

6. Accomplishments/Milestones Achieved:
The system design was split into two parts:
a) The airborne and ICEC baseband units
b) The satellite link equipment
The design of the baseband equipment advanced through a design study to a procurement specification which has been issued through DSS for proposals. The satellite link equipment, being more of an 'off-the-shelf' type, has lagged behind somewhat, but ground receiving sites have been chosen, and a procurement specification has been written and awaits T.B. funding approval for further action.

7. Problems Encountered/Resolution?
none

8. Publications/Reports in 85-86 or in Press:
a) Image Coding Assessment by Miller Communications (Contract KM147-3-2525)
b) Baseband Unit Design Study by Miller Communications (Contract T8493-5-0309)

9. Recommendations:

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: SATELLITE COMMUNICATIONS OERD Project Number: 67118

2. Department/Service: EC/AES
3. Proposed PERD Resources K$ (PY): 150.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	150.00	0.00	0.00	0.0	0.0	0.00

Total Panel K$ (PY): 150.00 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.00

Total EC K$ (PY) = 0.00 (0.0)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 0.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: INTEGRATED ICE RECCE SYSTEM OERD Project Number: 67122

2. Manager: D.H. CHAMP
Address: 4905 DUFFERIN STREET
DOWNSVIEW, ONTARIO
M3H 5T4
Department EC/AES
Phone Number: (416) 667-4724

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	445.00	0.0
PERD As spent	363.60	0.0
EC As spent	5.00	0.1
Other As spent	0.00	0.0
Total As spent	368.60	0.1

4. Contractor(s): L.V. URSEL AND ASSOCIATES
1755 WOODWARD DRIVE
OTTAWA, ONTARIO

5. 85-86 Objectives:
During 86/87 the contracts for system software and integration and hardware elements will be let. In 87/88 it is expected that the second half of the software will be written, and that system integration will begin.

6. Accomplishments/Milestones Achieved:
The integrated ice data system (IRDAS) functional specification was written in 84/85 which described in operational terms how the IRDAS would work. In 85/86 the following goals were set:

1. To confirm the functional specification after the review
2. To develop a system performance specification describing the main hardware and software elements
3. To develop a software overview to form the basis of detailed software specifications
4. To unite hardware procurement specifications and software requirement specifications.

7. Problems Encountered/Resolution?
none

8. Publications/Reports in 85-86 or in Press:

1. IRDAS Performance Specification by L.V. Ursel and Associates
2. Software Overview by L.V. Ursel and Associates
3. Hardware Unit specifications by L.V. Ursel and Associates

9. Recommendations:

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: INTEGRATED ICE RECCE SYSTEM OERD Project Number: 67122

2. Department/Service: EC/AES
3. Proposed PERD Resources K$ (PY): 445.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	362.60	0.00	0.00	0.0	0.0	1.00

Total Panel K$ (PY): 363.60 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	5.0	0.1	0.0	0.00	0.00	0.00	0.0	0.0	0.00

Total EC K$ (PY) = 5.00 (0.1)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
nil	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 0.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: PREDICTION OF OIL SPILL MOVEMENT IN ICE LADEN WATERS
OERD Project Number: 67126
2. Manager: H. Allard
Address: Montreal
Department EC/AES
Phone Number: (514) 683-8104

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	90.00	0.0
PERD As spent	0.00	0.0
EC As spent	0.00	0.1
Other As spent	0.00	0.0
Total As spent	0.00	0.1

4. Contractor(s): see Item 7.

5. 85-86 Objectives:
- report on modelling the behaviour of oil in the presence of breaking waves.
- upgrading of software and software documentation for the oil spill trajectory forecast system.

6. Accomplishments/Milestones Achieved:
The oil spill motion prediction system, developed with PERD funds in earlier years, was used with success in a spill emergency created by damage to one of ESSO's artificial islands in the Beaufort Sea during a September 1985 storm. The system was recognized as having performed well by all parties concerned. The system was also used in a spill exercise conducted on Lake Ontario.

7. Problems Encountered/Resolution?
-$127 K requested and 89.5 K allocated.
-Breaking waves oil study cancelled due to lack of funds
-Contractor delayed due to spending freeze - re-slated for FY 86-87.

8. Publications/Reports in 85-86 or in Press:
nil

9. Recommendations:
The project should continue as proposed.

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: PREDICTION OF OIL SPILL MOVEMENT IN ICE LADEN WATERS   OERD Project Number: 67126
2. Department/Service: EC/AES
3. Proposed PERD Resources K$ (PY): 90.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contrib-ution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.0

Total Panel K$ (PY): 0.00 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contrib-ution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.1	0.0	0.00	0.00	0.00	0.0	0.0	0.0

Total EC K$ (PY) = 0.00 (0.1)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 0.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: ATLANTIC STORMS OERD Project Number: 67135

2. Manager: DR. A.J. CHISHOLM Department EC/AES
Address: DIRECTOR, ATMOSPHERIC PROCESSES Phone Number: (416) 667-4816
RESEARCH BRANCH
4905 DUFFERIN ST. DOWNSVIEW, ONT.

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	987.00	1.0
PERD As spent	1190.00	1.0
EC As spent	1050.00	22.0
Other As spent	200.00	3.0
Total As spent	2440.00	26.0

4. Contractor(s): National Research Council, Canada Centre for Remote Sensing, McGill University, University of Quebec at Montreal, and the Department of Nationl Defence.

5. 85-86 Objectives:
The objective of this period was to conduct the meteorological component of the CASP field experiment from January 15 to March 15, 1986. The objective of this field experiment was to test real-time forecasting techniques as well as to acquire a data set of sufficient resolution to lead to improvements in forecasting in the longer term.

6. Accomplishments/Milestones Achieved:
The largest storm experiment ever conducted in Canada was completed. Over the two month field experiment, 16 storms were sampled. Many of these produced heavy precipitation, freezing precipitation, or deepened rapidly over or just to the south of the CASP area. No other project in the world has amassed so much information on these phenomena. Ten of these storms were also sampled in cooperation with the Americal GALE project so that the evolution of these storms can be examined over a several day period.

7. Problems Encountered/Resolution?
All problems associated with planning and operating a field experiment were tackled.

8. Publications/Reports in 85-86 or in Press:
A number of CASP documents were prepared in relation to the field experiment. These were generally produced in cooperation with personnel at the Bedford Institute of Oceanography. The reports are:

1.	Experimental Design Document	December, 1985
2.	Operations Plan	December, 1985
3.	Management Processes	December, 1985
4.	Data Management Report (draft)	December, 1985

9. Recommendations:

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: ATLANTIC STORMS   OERD Project Number: 67135

2. Department/Service: EC/AES
3. Proposed PERD Resources K$ (PY):   987.00 (1.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contrib- ution	Sal.& Ben.	(PY)		Fees Paid
			Sci./ Tech.	Admin.				Sci./ Auth.	Admin.	
565.00	220.00	40.0	1.0	0.0	355.00	0.00	0.00	0.0	0.0	10.00

Total Panel K$ (PY):   1190.00 (1.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contrib- ution	Sal.& Ben.	(PY)		Fees Paid
			Sci./ Tech.	Admin.				Sci./ Auth.	Admin.	
100.00	100.00	850.0	20.0	2.0	0.00	0.00	0.00	0.0	0.0	0.00

Total EC K$ (PY) =   1050.00 (22.0)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
University, NRC, CCRS	70.00	0.00	130.0	0.00	3.0

Total Other K$ (PY) =   200.00 (3.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: LNG SPILL CONTROL OERD Project Number: 67219

2. Manager: DR. J.W.S. YOUNG
Address: 4905 DUFFERIN STREET
DOWNSVIEW, ONT.
M3H 5T4

Department EC/AES
Phone Number: (416) 667-4937

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	100.00	0.0
PERD As spent	1.20	0.0
EC As spent	5.00	0.1
Other As spent	0.00	0.0
Total As spent	6.20	0.1

4. Contractor(s): GAS RESEARCH INSTITUTE
CHICAGO, ILL. USA

5. 85-86 Objectives:
Development of assessment techniques for spills of LNG/LPG.

6. Accomplishments/Milestones Achieved:

1. The GRI assessment of 3D numerical models has found 2 models to be unacceptable. Modifications are being made to the remaining 2 models to reduce numerical errors and to improve the air entrainment model.
2. A decision was made to postpone LNG model funding pending results of application. Funds were transferred to CASP.
3. An agreement was signed by AES and concord Scientific giving Concord an exclusive licence to market the model. The model was used for two environmental impact assessments. Areas for development were identified for 1986/87.

7. Problems Encountered/Resolution?

8. Publications/Reports in 85-86 or in Press:
The GRI final report on the 3D model assessment is not yet available. Papers describing the LNG model and its upgraded version name COBRA were given at conferences and seminars in St. Louis, Calgary and Montreal.

9. Recommendations:
-maintenance fund (25K/yr) for COBRA for minor upgrades to model/user guide.
-large 3D numerical models not suitable for routine application

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: LNG SPILL CONTROL OERD Project Number: 67219

2. Department/Service: EC/AES
3. Proposed PERD Resources K$ (PY): 100.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
1.20	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.00

Total Panel K$ (PY): 1.20 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	0.00	0.00	5.00	0.1	0.0	0.00

Total EC K$ (PY) = 5.00 (0.1)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 0.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: ICE AND WIND ON TRANSMISSION LINES
OERD Project Number: 68203
2. Manager: S. Lapczak
Department EC/AES
Address: Atmospheric Environment Service
4905 Dufferin Street
Downsview, Ontario M3H 5T4
Phone Number: (416) 667-4826

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	75.00	0.0
PERD As spent	21.70	0.0
EC As spent	6.80	0.2
Other As spent	0.00	0.0
Total As spent	28.50	0.2

4. Contractor(s): W. F. Baird and Associates
1390 Prince of Wales Drive
Suite 309
Ottawa, Ontario K2C 3N6
Environmental Applications Group
114 Avenue Road
Toronto, Ontario M5r 2H4

5. 85-86 Objectives:
- Completion of thorough testing of ice accretion models.
- Completion of examination of extreme value analysis methods.
- Ensure preparations for the Third International Workshop on the Atmospheric Icing of Structures are completed.

6. Accomplishments/Milestones Achieved:
- Completion of literature review and some testing of extreme value analysis methods.
- Support for preparations for Third Workshop adequate to ensure it will be held in May 1986.
- Continued close cooperation with the Canadian Electrical Association and its member utilites.

7. Problems Encountered/Resolution?
Continued resource cuts and limitations have diluted resources so that the overall project objectives cannot be achieved; reassessment of project resulted in dropping of the second overall objective of developing an interpolation/extrapolation methodology in the context of current approved funding.

8. Publications/Reports in 85-86 or in Press:
- "Ice Accretion Model Selection", Canadian Climate Centre Report (unpublished report in press).

9. Recommendations:
Extend funding for further three years to allow originally planned development of interpolation/extrapolation methodology.

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: ICE AND WIND ON TRANSMISSION LINES   OERD Project Number: 68203
2. Department/Service: EC/AES
3. Proposed PERD Resources K$ (PY): 75.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contrib-ution	Sal.& Ben.	(PY)		Fees Paid
			Sci./ Tech.	Admin.				Sci./ Auth.	Admin.	
12.80	0.00	0.0	0.0	0.0	8.50	0.00	0.00	0.0	0.0	0.40

Total Panel K$ (PY): 21.70 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contrib-ution	Sal.& Ben.	(PY)		Fees Paid
			Sci./ Tech.	Admin.				Sci./ Auth.	Admin.	
0.00	0.00	6.8	0.1	0.1	0.00	0.00	0.00	0.0	0.0	0.00

Total EC K$ (PY) = 6.80 (0.2)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 0.00 (0.0)

CORPORATE PLANNING GROUP COORDINATION

TABLE 4

DEPARTMENT: EC

MYOP PLANNING ELEMENT: CPG

PANEL ON ENERGY R&D

july 10, 1987

PERD #	TITLE	1985-86 PROPOSED PERD		1985-86 AS SPENT K$ AND PY's																										
				INTRAMURAL PERD					EXTRAMURAL PERD					DSS	TOTAL PERD	INTRAMURAL EC RESOURCES					EXTRAMURAL EC RESOURCES					DSS	TOTAL EC	TOTAL OTHER	TASK TOTAL	
		K$	PY	O&M	Capital	Sal/Ben	S/T PY	Adm PY	Contract	GAC	Sal/Ben	SA PY	Adm PY	FFES PERD	$	O&M	Capital	Sal/Ben	S/T PY	Adm PY	Contract	GAC	Sal/Ben	SA PY	Adm PY	FFES EC	$	RES $	K$	PY
251081	Departmental R&D Coordination	92	1.0	19	5	28	1	0.0	50	0	28	1	0.0	0	130	0	0	0	0	0.2	0	0	38	1	0.1	0	46	0	176	1.8
	Subtotal TASK 2	92	1.0	19	5	28	0.5	0.0	50	0	28	0.5	0.0	0	130	0	0	0	0.0	0.2	0	0	38	0.5	0.1	0	46	0	176	1.8

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: Departmental R&D Coordination OERD Project Number: 25108

2. Manager: W. Richardson
Address: LTC
22nd Floor
Hull, Quebec

Department EC/CPG
Phone Number: (819) 994-5166

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	92.00	1.0
PERD As spent	130.00	1.0
EC As spent	46.00	0.8
Other As spent	0.00	0.0
Total As spent	176.00	1.8

4. Contractor(s): George Greene Consultant, Ottawa, Ontario
Dave Thomas, Seakem Oceanography, Victoria, B.C.
Banff School of Management, Banff, Alberta
Cadham-Hayes Consultants, Ottawa, Ontario

5. 85-86 Objectives: -coordinate EC energy R & D programme
-provide programme/financial liaison with OGD's, industry, universities, provinces.

6. Accomplishments/Milestones Achieved:
-Chaired, contributed paper and published proceedings from workshop on Oil Sands/Heavy Oil and the Environment, Calgary, April 24-26, 1985.
-Reviewed and published Workshop Report on Environmental R&D related to Offshore Oil and Gas Activities in Canada, July, 1985.
-Reviewed EMR Cab. Doc. on Energy R&D and prepared notes for Minister's office fall, 1985.
-Assisted in planning agenda for federal/provincial/industry Workshop on Oil Sands Tailings Pond Water Treatment - Fort McMurray, Oct. 26-30, 1985.
-Co-sponsored Int'l Workshop on Winds and Icing, Halifax, Oct. 7-11, 1985.
-Provided (with DFO) a comprehensive response to the oil industry review of PERD task 6 R&D programs.
-Published Department's 1983/84 Annual Report on Energy R&D.
-Coordinated and prepared departmental package of PERD proposals for 1986/87, forwarded to EMR and prepared summary of Department's non-PERD energy R&D resources for EMR input into Int'l Energy Agency statistics report.
-Chaired annual budget meeting for PERD Task 2 and Task 6 Environment Committees ($2M and $7M respectively) and reviewed/finalized/updated PERD MYOP for Department on Task 2 and 6 Environment Committees.
-worked with Services and EMR to conduct budget reduction exercise of $1.1M.

7. Problems Encountered/Resolution?

8. Publications/Reports in 85-86 or in Press:
Energy Research & Development Programme Annual Report, 1983.
1985. Oil Sands/Heavy Oil and the Environment, Proceedings from the Workshop on Research and Development related to Oil Sands, Heavy Oil and The Environment, April 24-26, 1985.
1985. Offshore Environmental Research and Development Related to Offshore Oil and Gas Activities in Canada : Background Document and Results of the Gov't/Industry Workshop and PERD 6.7 Committee Meeting held in Calgary, Alta., Feb., 11-13, 1985.

9. Recommendations:

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: Departmental R&D Coordination OERD Project Number: 25108

2. Department/Service: EC/CPG
3. Proposed PERD Resources K$ (PY): 92.00 (1.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
19.00	5.00	28.0	0.5	0.0	50.00	0.00	28.00	0.5	0.0	0.0

Total Panel K$ (PY): 130.00 (1.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	8.0	0.0	0.2	0.00	0.00	38.00	0.5	0.1	0.0

Total EC K$ (PY) = 46.00 (0.8)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 0.00 (0.0)

ENVIRONMENTAL CONSERVATION SERVICE

TABLE 5

DEPARTMENT: EC   MYOP PLANNING ELEMENT: ECS   PANEL ON ENERGY R&D   july 10, 1987

PERD #	TITLE	1985-86 PROPOSED PERD		1985-86 AS SPENT K$ AND PY's																										
				INTRAMURAL PERD					EXTRAMURAL PERD						TOTAL PERD	INTRAMURAL EC RESOURCES					EXTRAMURAL EC RESOURCES						TOTAL EC	TOTAL OTHER	TASK TOTAL	
		K$	PY	O&M	Capital	Sal/Ben	S/T PY	Adm PY	Contract	GAC	Sal/Ben	SA PY	Adm PY	DSS FFES PERD	$	O&M	Capital	Sal/Ben	S/T PY	Adm PY	Contract	GAC	Sal/Ben	SA PY	Adm PY	DSS FFES EC	$	RES $	K$	PY
25102	Water Supply Constraints	148	1.0	50	0	36	1	0.0	62	0	0	0	0.0	0	148	0	0	0	0	0.0	0	0	0	0	0.0	0	0	0	149	1.0
	Subtotal TASK 2	148	1.0	50	0	36	0.8	0.0	62	0	0	0.2	0.0	0	148	0	0	0	0.0	0.0	0	0	0	0.0	0.0	0	0	0	148	1.0
41301	SMALL SCALE HYDRO	150	0.0	6	0	0	0	0.0	137	0	0	0	0.0	6	148	3	0	14	0	0.0	0	0	26	1	0.0	0	43	0	191	0.9
	Subtotal TASK 4	150	0.0	6	0	0	0.0	0.0	137	0	0	0.0	0.0	6	148	3	0	14	0.3	0.0	0	0	26	0.6	0.0	0	43	0	191	0.9
62114	DEEP WATER WAVE BREAKING	100	0.0	94	0	0	0	0.0	6	0	0	0	0.0	0	100	26	30	229	5	0.0	0	0	0	0	0.0	0	285	0	385	4.9
62307	WAVE FORCES ON UNDERSEA PIPELINES IN OPERN TRENCHES	50	0.0	50	0	0	0	0.0	0	0	0	0	0.0	0	50	2	0	98	2	0.0	0	0	0	0	0.0	0	100	0	150	1.5
67208	OIL POISONING OF SEABIRDS	110	0.0	20	83	0	0	0.0	0	0	0	0	0.0	0	103	0	0	15	1	0.0	0	0	15	1	0.0	0	30	0	133	1.0
	Subtotal TASK 6	260	0.0	164	83	0	0.0	0.0	6	0	0	0.0	0.0	0	253	28	30	342	6.9	0.0	0	0	15	0.5	0.0	0	415	0	668	7.4

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: Water Supply Constraints OERD Project Number: 25102

2. Manager: P.J. Reynolds Department EC/ECS
Address: Water Planning/Mgt IWD Phone Number: (819) 997-2071
9th Floor
Place Vincent Massey, Hull

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	148.00	1.0
PERD As spent	148.00	1.0
EC As spent	0.00	0.0
Other As spent	0.00	0.0
Total As spent	148.00	1.0

4. Contractor(s): Acres International Limited
5259 Dorchester Rd., P.O. Box 1001
Niagra Falls, Ontario
L2E 6W1

5. 85-86 Objectives: -to incorporate IWD's industrial water use survey and municipal database into the WUAM, and add a capability to test water supply:demand management alternatives for balancing future water uses and supplies in the Prairie region; to improve the WUAM by including modules for minumum flow apportionment and reservoir operation, together with the necessary data - followed by testing the impacts of various future development scenarios

6. Accomplishments/Milestones Achieved:
-completion of development of water demand forecasts for the industrial and municipal sectors and expansion of database and model improvement.
-completion of model applications including calibration and testing of scenarios. Completion of report production and administration.
-receipt and acceptance of all deliveries

7. Problems Encountered/Resolution?
-problems with collecting data on price elasticity of water demands
-more data and work needed for water supplies from underground and surface water sources

8. Publications/Reports in 85-86 or in Press:
-Phase V reports (two) to be released end of April 1986
-Three reports on the accomplishments of Phase IV

9. Recommendations:
-expansion of water supply database (additional $141/yr to complete project); incorporate groundwater supply data into WUAM; include water quality in model.

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: Water Supply Constraints OERD Project Number: 25102

2. Department/Service: EC/ECS
3. Proposed PERD Resources K$ (PY): 148.00 (1.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
50.00	0.00	36.1	0.8	0.0	61.90	0.00	0.00	0.2	0.0	0.00

Total Panel K$ (PY): 148.00 (1.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.00

Total EC K$ (PY) = 0.00 (0.0)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 0.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: SMALL SCALE HYDRO OERD Project Number: 41301

2. Manager: E.T. PARK/K.D. Harvey
Address: 9TH FLOOR, PVM
HULL, QUEBEC
K1A 0E7

Department EC/ECS
Phone Number: (613) 997-2308

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	150.00	0.0
PERD As spent	148.35	0.0
EC As spent	43.00	0.9
Other As spent	0.00	0.0
Total As spent	191.35	0.9

4. Contractor(s): CHARLES HOWARD & ASSOCIATES LTD.
VICTORIA B.C.
A.J. Robinson & Associates Inc.
Kanata, Ontario

5. 85-86 Objectives: To develop hydrologic design methodology for determination of available streamflow for power generation and flood for spillway capacity applicable for feasibility level analyses for selected sub-regions in British Columbia; to modify conventional methodologies of short-term and long-term streamflow forecasting by incorporating the use of data acquired via contemporary remote sensing technologies and apply to Canadian watershed.

6. Accomplishments/Milestones Achieved:
Final reports including a manual, computer model and documentation were completed as scheduled. The results are presented in three separate volumes:
-Documentation
-Application Manual including computer model
-Summary
The regional office of EM&R in Vancouver is receiving a large number of requests from prospective developers for technical assistance for small-scale or micro-scale hydro developments. The model developed under this project will be used by both DOE and EM&R regional offices to respond to those requests.
-identification and assessment of relevant operational remote sensing techniques and hydrologic models.
-incorporation of selected remote sensing techniques into SSARR model and demonstration on Tobique watershed in Saint John River Basin.

7. Problems Encountered/Resolution?
The study was initiated late (August 1985) due to funding approval and contractual procedures.
-re-submission of Phase I report delayed Phase II by three months

8. Publications/Reports in 85-86 or in Press:

-Phase IIA reports scheduled for release in May 1985

-Review of Operational Remote Sensing Techniques and Streamflow Forecasting Techniques, Phase I of A Study of Methodologies of Streamflow Forecasting Incorporating Remotely-Sensed Data.

-Use of Operational Remote Sensing Techniques in a SSARR Model Application in the Saint John River Basin, Phase II of A Study of Methodologies of Streamflow Forecasting Forecasting Incorporating Remotely-Sensed Data (in press)

9. Recommendations:

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: SMALL SCALE HYDRO   OERD Project Number: 41301

2. Department/Service: EC/ECS
3. Proposed PERD Resources K$ (PY):   150.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contrib-ution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
5.80	0.00	0.0	0.0	0.0	136.90	0.00	0.00	0.0	0.0	5.65

Total Panel K$ (PY):   148.35 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contrib-ution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
3.00	0.00	14.0	0.3	0.0	0.00	0.00	26.00	0.6	0.0	0.00

Total EC K$ (PY) =   43.00 (0.9)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) =   0.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: DEEP WATER WAVE BREAKING OERD Project Number: 62114

2. Manager: M.A. DONELAN Department EC/ECS
Address: CCIW Phone Number: (416) 336-4879
BURLINGTON, ONTARIO
L7R 4A6

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	100.00	0.0
PERD As spent	100.00	0.0
EC As spent	285.00	4.9
Other As spent	0.00	0.0
Total As spent	385.00	4.9

4. Contractor(s):

5. 85-86 Objectives: To complete Phase 1 of the field experiment in Lake Ontario including the measurement of orbital velocities and dissipation beneath a white capping sea.

6. Accomplishments/Milestones Achieved:
Field program was successfully carried out including:
1) velocity measurements along a vertical profile with drage spheres (Canadian) and acoustic (U.S.) current meters
2) wave directional array measurements (Canadian)
3) bubble distributions under white caps by acoustic backscatter (U.S.)
4) pressure and stress over waves (Can.).
About 160 hours of data were collected and are being analysed.

7. Problems Encountered/Resolution?
The main problems centered on the radio transmission of U.S. current meter data. In 86/87 we will probably go to cable transmission of all data.

8. Publications/Reports in 85-86 or in Press:
Paper in preparation for the International Workshop on Wave Hindcasting and Forecasting at Bedford Institute in September. The paper is entitled "Observations of Velocities Beneath Wind Driven waves" by M. Donelan and K. Kahma.

9. Recommendations:
To continue field program in fall of both 86 & 87 as planned. These 3 seasons should yield sufficient data to allow compilation of decent statistics.

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: DEEP WATER WAVE BREAKING OERD Project Number: 62114

2. Department/Service: EC/ECS
3. Proposed PERD Resources K$ (PY): 100.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
94.00	0.00	0.0	0.0	0.0	6.00	0.00	0.00	0.0	0.0	0.00

Total Panel K$ (PY): 100.00 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
26.00	30.00	229.0	4.9	0.0	0.00	0.00	0.00	0.0	0.0	0.00

Total EC K$ (PY) = 285.00 (4.9)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 0.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: WAVE FORCES ON UNDERSEA PIPELINES IN OPEN TRENCHES

OERD Project Number: 62307

2. Manager: M.G. SKAFEL

Address: CCIW
BURLINGTON, ONTARIO
L7R 4A6

Department EC/ECS
Phone Number: (416) 336-4736

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	50.00	0.0
PERD As spent	50.00	0.0
EC As spent	100.00	1.5
Other As spent	0.00	0.0
Total As spent	150.00	1.5

4. Contractor(s):

5. 85-86 Objectives:
1) To prepare a report summarizing previous work on the question of wave loading on submarine pipelines.
2) To conduct a series of experiments aimed at determining the relationship between forces and hydrodynamic parameters for submarine pipelines in trenches.

6. Accomplishments/Milestones Achieved:
1) A review report was prepared and distributed (see 8)
2) Experimental equipment was designed, constructed and instrumented. The model pipeline was installed and preliminary testing started as of 31 March 1986.
3) The work on caisson retained artificial islands completed in previous years under this study was reported at the Canadian Coastal Conference 1985, St. John's Nfld.

7. Problems Encountered/Resolution?

Because of complexities in design, the model instrumented pipeline took longer to have constructed than anticipated. Only one model pipe could be constructed within the budget. The bulk of the testing of this pipe will take place in 1986/87.

8. Publications/Reports in 85-86 or in Press:

Skafel, M.G. 1985 Wave Forces on Pipelines: A Review. NWRI Unpublished Report.

Skafel, M.G., J.T. Judge, and C.T. Bishop 1985 Wave Field Around Caisson Retained Artificail Islands, NRCC, Proc. Canadian Coastal Conference pp 383-396.

Bishop, C.T., J.T. Judge and M.G. Skafel 1985 Modelling Wave Overtopping of a Caisson Retained Artificial Island, NRCC, Proc. Canadian Coastal Conference pp 397-412.

9. Recommendations:
-Experimental pipeline wave force work should be continued and funding increased in 1987/88 to allow for broader range of parameters.

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: WAVE FORCES ON UNDERSEA PIPELINES IN OPEN TRENCHES — OERD Project Number: 62307
2. Department/Service: EC/ECS
3. Proposed PERD Resources K$ (PY): 50.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
50.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.00

Total Panel K$ (PY): 50.00 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
2.00	0.00	98.0	1.5	0.0	0.00	0.00	0.00	0.0	0.0	0.00

Total EC K$ (PY) = 100.00 (1.5)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 0.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: OIL POISONING OF SEABIRDS OERD Project Number: 67208

2. Manager: Dr. D.B. Peakall Department EC/ECS
Address: Nat'l Wildlife Research Center Phone Number: (819) 997-2780
CWS, Environment Canada, Ottawa
K1A OE7,

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	110.00	0.0
PERD As spent	103.00	0.0
EC As spent	30.00	1.0
Other As spent	0.00	0.0
Total As spent	133.00	1.0

4. Contractor(s): Dept of Biochemistry, Memorial University,
St. John's Newfoundland
Dept. of Veterinary Medicine, U of Saskatchewan,
Saskatoon, Saskatchewan

5. 85-86 Objectives:
-complete evaluation of histopathological parameters on gulls
-extend findings on gulls to other species of seabirds

6. Accomplishments/Milestones Achieved:
-histopathological studies in gulls were completed using three doses of oil and at two time periods after exposure
-studies were carried out on two pelagic species, viz Atlantic Puffin and Leach's Storm Petrel.

7. Problems Encountered/Resolution?
-None

8. Publications/Reports in 85-86 or in Press:
Peakall, D.B., Jeffrey, D.A. & Miller, D.S. Weight loss of Herring Gulls exposed to oil and oil emulsion, Ambio, 14:108-110, 1985.
Jeffrey. D.A., Peakall, D.B., Miller, D.S. & Herzberg, G.R., Blood Chemistry Changes in food-derived herring gulls, Comp. Biochem. Physiol. 81A:911-913, 1985.
Leighton, F.A., Butler, R.G. & Peakall, D.B. Oil and arctic marine birds: An assessment of risk. In: Petroleum effects in the Arctic Environment. Ed. F.R. Engelhardt. Elsevier, London, 1985. pp. 183-215.
Peakall, D.B., Wells, P.G. & Mackay, D. A hazard assessment of chemically dispersed oil spills and seabirds. Proc. 8th Annual Marine Oilspill Program Techican Seminar, 1985. pp. 78-90.
Leighton, F.A., Lee, Y.Z., Rahimtula, A.D., O'Brien, P.J. & Peakall, D.B., Biochemical and functional disturbances in red blood cells of herring gulls

ingesting prudhoe bay crude oil. Toxicol. Appl. Pharmacol. 81:25-31, 1985.

9. Recommendations:
-Complete project

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: OIL POISONING OF SEABIRDS OERD Project Number: 67208

2. Department/Service: EC/ECS
3. Proposed PERD Resources K$ (PY): 110.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contrib-ution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
20.00	83.00	0.0	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.00

Total Panel K$ (PY): 103.00 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contrib-ution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	15.0	0.5	0.0	0.00	0.00	15.00	0.5	0.0	0.00

Total EC K$ (PY) = 30.00 (1.0)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 0.00 (0.0)

ENVIRONMENTAL PROTECTION SERVICE

TABLE 6

DEPARTMENT: EC

MYOP PLANNING ELEMENT: EPS

PANEL ON ENERGY R&D

july 10, 1987

PERD #	TITLE	1985-86 PROPOSED PERD		1985-86 AS SPENT K$ AND PY's																								
				INTRAMURAL PERD					EXTRAMURAL PERD					DSS	TOTAL PERD	INTRAMURAL EC RESOURCES					EXTRAMURAL EC RESOURCES					DSS	TOTAL EC	TOTAL OTHER	TASK TOTAL	
		K$	PY	O&M	Capital	Sal/Ben	S/T PY	Adm PY	Contract	G&C	Sal/Ben	SA PY	Adm PY	FEES PERD	$	O&M	Capital	Sal/Ben	S/T PY	Adm PY	Contract	G&C	Sal/Ben	SA PY	Adm PY	FEES EC	$	RES $	K$	PY
12201	DRECT	913	2.0	19	0	122	2	0.0	183	0	0	0	0.0	7	331	3	0	0	0	0.0	0	0	0	0	0.0	0	3	0	334	2.0
12202	SEWAGE TREATMENT	166	0.0	88	55	0	0	0.0	126	0	0	0	0.0	15	283	47	34	116	3	0.0	0	0	23	1	0.0	0	219	100	502	3.0
12203	INCINERATOR TEST & EVALUATION	96	0.0	0	0	0	0	0.0	445	0	0	0	0.0	0	445	310	0	120	3	0.0	460	0	0	0	0.0	0	890	20	1335	2.8
122A1	DRECT - RECYCLING	46	0.0	0	0	0	0	0.0	46	0	0	0	0.0	0	46	0	0	72	1	0.2	33	0	0	0	0.0	0	105	252	151	1.2
12305	PULP AND PAPER	99	0.0	2	0	0	0	0.0	50	0	0	0	0.0	1	53	0	0	0	0	0.0	0	0	12	0	0.0	0	12	0	65	0.2
123A5	PULP & PAPER - PUMPS FOR WASTE HEAT RECOVERY	120	0.0	5	0	0	0	0.0	78	0	0	0	0.0	2	85	0	0	0	0	0.0	0	0	12	0	0.0	0	12	0	97	0.2
	Subtotal TASK 1	1440	2.0	114	55	122	2.0	0.0	928	0	0	0.0	0.0	25	1243	360	34	308	6.3	0.2	493	0	47	0.9	0.0	0	1241	372	2484	9.4
24102	HYDROGEOLOGICAL ASPECTS OF BITUMEN/HEAVY OIL RECOVERY	200	0.0	0	0	0	0	0.0	31	0	0	0	0.0	0	31	0	0	0	0	0.0	0	0	0	0	0.0	0	0	0	31	0.0
24104	OIL SANDS TAILINGS - WATER TREATMENT	250	0.0	0	0	0	0	0.0	36	0	0	0	0.0	0	36	0	0	0	0	0.0	0	0	0	0	0.0	0	0	0	36	0.0
24105	TREATMENT OF AQUEOUS EFFLUENTS FROM INSITU OPERATIONS	256	1.0	88	51	27	1	0.0	289	0	7	0	0.0	6	469	30	30	185	4	0.0	0	0	46	1	0.0	0	291	0	760	6.0
24106	TREATMENT OF OIL/WATER/SAND IN-SITU SLUDGES	105	0.0	2	0	0	0	0.0	104	0	0	0	0.0	0	105	14	0	0	0	0.0	0	0	8	0	0.0	0	22	0	127	0.2

TABLE 6 CONT'D

DEPARTMENT: EC MYOP PLANNING ELEMENT: EPS PANEL ON ENERGY R&D july 10, 1987

PERD #	TITLE	1985-86 PROPOSED PERD		1985-86 AS SPENT K$ AND PY's																										
				INTRAMURAL PERD					EXTRAMURAL PERD						TOTAL PERD	INTRAMURAL EC RESOURCES					EXTRAMURAL EC RESOURCES						TOTAL EC	TOTAL OTHER	TASK TOTAL	
		K$	PY	O&M	Capital	Sal/Ben	S/T PY	Adm PY	Contract	G&C	Sal/Ben	SA PY	Adm PY	DSS FEES PERD	$	O&M	Capital	Sal/Ben	S/T PY	Adm PY	Contract	G&C	Sal/Ben	SA PY	Adm PY	DSS FEES EC	$	RES $	K$	PY
241071	ABATEMENT OF ACID GAS	250	0.0	0	0	0	0	0.0	0	0	0	0	0.0	0	0	0	0	0	0	0.0	0	0	0	0	0.0	0	0	0	0	0.0
242011	ENVIROM'L PROTEC'N CRITERIA FOR COAL MINING & PROC FACIL.	124	1.0	38	0	55	1	0.0	28	0	0	0	0.0	5	125	0	0	14	0	0.0	0	0	0	0	0.0	0	14	25	139	1.2
242041	SLURRY TRANSPORTATION	55	0.0	0	0	0	0	0.0	0	0	0	0	0.0	0	0	0	0	0	0	0.0	0	0	0	0	0.0	0	0	0	0	0.0
243031	FLUE GAS DESULPHURIZATION/DEV. OF RECOMMENDED WATER-MGT PRAC.	108	1.0	8	0	0	0	0.0	10	0	55	1	0.0	0	73	0	0	0	0	0.0	0	0	0	0	0.0	0	0	10	73	1.0
243041	FRC TECHNOLOGY-ASSESSMENT OF WATER POLLUTION POTENTIAL	157	0.0	42	0	0	0	0.0	67	0	0	0	0.0	1	110	0	0	0	0	0.0	0	0	8	0	0.0	0	8	0	118	0.2
	Subtotal TASK 2	1505	3.0	178	51	82	1.8	0.0	565	0	62	1.2	0.0	12	949	44	30	199	4.2	0.0	0	0	62	1.4	0.0	0	335	35	1284	8.6
436041	ANAEROBIC DIGESTION	172	0.0	19	0	0	0	0.0	133	0	0	0	0.0	5	156	0	36	139	3	0.0	0	0	23	1	0.0	0	198	12	354	3.5
	Subtotal TASK 4	172	0.0	19	0	0	0.0	0.0	133	0	0	0.0	0.0	5	156	0	36	139	3.0	0.0	0	0	23	0.5	0.0	0	198	12	354	3.5
512021	DEMONSTRA'N OF LIQUID FUEL PRODUC'N FROM SEWAGE SLUDGE	450	0.0	41	47	0	0	0.0	348	0	0	0	0.0	18	450	4	5	51	1	0.1	0	0	23	1	0.0	0	83	230	533	1.6
571011	POLLUT'N ABATEM'T TECH-BITUMEN HVY OIL/CL COPRO UPGRD&NAT GAS	192	1.0	0	0	0	0	0.0	124	0	57	1	0.0	0	181	0	0	0	0	0.0	0	0	0	0	0.0	0	0	0	181	1.1
571031	DEV PROCESS TECH RE TREATMENT WASTE WATERS FRM COAL LIQUEF'N	107	1.0	0	19	32	1	0.0	77	0	0	0	0.0	3	136	0	0	23	0	0.0	0	0	0	0	0.0	0	23	0	159	1.5

TABLE 6 CONT'D

DEPARTMENT: EC | MYOP PLANNING ELEMENT: EPS | PANEL ON ENERGY R&D | july 10, 1987

OERD #	TITLE	1985-86 PROPOSED PERD K$	1985-86 PROPOSED PERD PY	1985-86 AS SPENT K$ AND PY's: INTRAMURAL PERD O&M	Capital	Sal/Ben	S/T PY	Adm PY	EXTRAMURAL PERD Contract	G&C	Sal/Ben	SA PY	Adm PY	DSS FEES PERD	TOTAL PERD $	INTRAMURAL EC RESOURCES O&M	Capital	Sal/Ben	S/T PY	Adm PY	EXTRAMURAL EC RESOURCES Contract	G&C	Sal/Ben	SA PY	Adm PY	DSS FEES EC	TOTAL EC $	TOTAL OTHER RES $	TASK TOTAL K$	TASK TOTAL PY
	Subtotal TASK 5	749	2.0	41	61	37	1.0	0.0	549	0	57	1.0	0.0	21	767	4	5	74	1.3	0.1	0	0	23	0.8	0.0	0	106	230	873	4.2
672201	TREATMENT TECHNOLOGIES-OIL & GAS MARINE PRODUCT'N WASTES	60	0.0	29	0	0	0	0.0	0	0	0	0	0.0	0	29	0	0	0	0	0.1	0	0	0	0	0.0	0	0	0	29	0.3
672203	RESIDUAL TOXICITY AND DEBRIS - OFFSHORE WELL SITES	20	0.0	0	0	0	0	0.0	18	0	0	0	0.0	0	18	0	0	0	0	0.0	0	0	0	0	0.0	0	0	0	18	0.0
672204	NORTHERN RESOURCE RECOVERY AND RECYCLING	40	0.0	5	0	0	0	0.0	15	0	0	0	0.0	1	20	0	0	0	0	0.0	0	0	0	0	0.0	0	0	0	20	0.0
672205	TECH. ASSESSMENT/DEVELOPMENT - PRODUCT STORAGE	102	1.0	18	0	0	0	0.0	26	0	29	1	0.0	1	74	0	0	0	0	0.0	0	0	0	1	0.0	0	0	0	74	1.0
672206	REMOTE SENSING-CHRONIC OIL DISCHARGES	60	0.0	0	0	0	0	0.0	50	0	0	0	0.0	2	52	0	0	0	0	0.0	0	0	0	0	0.0	0	0	0	52	0.1
672207	FISH CONCENTRATIONS NEAR DREDGES	40	0.0	0	0	0	0	0.0	0	0	0	0	0.0	0	0	0	0	0	0	0.0	0	0	0	0	0.0	0	0	0	0	0.0
672220	SUBSURFACE OIL	60	0.0	0	0	0	0	0.0	50	0	0	0	0.0	10	68	0	0	0	0	0.0	0	0	0	0	0.0	0	0	0	68	0.1
672225	MONITORING TECHNOLOGY	50	0.0	0	0	0	0	0.0	49	0	0	0	0.0	2	50	0	0	0	0	0.0	15	0	0	0	0.0	1	16	0	66	0.1
672232	PROTOCOLS/DRILLING FLUID TESTING	25	0.0	0	0	0	0	0.0	17	0	0	0	0.0	0	17	0	0	0	0	0.0	0	0	0	0	0.0	0	0	10	17	0.0
672237	INTEGRATED HYDROCARBON MONITORING SYSTEM	0	0.0	0	0	0	0	0.0	20	0	0	0	0.0	0	20	0	0	0	0	0.0	0	0	0	0	0.0	0	0	0	20	0.1

TABLE 6 CONT'D

DEPARTMENT: EC

MYOP PLANNING ELEMENT: EPS

PANEL ON ENERGY R&D

july 10, 1987

PERD #	TITLE	1985-86 PROPOSED PERD		1985-86 AS SPENT K$ AND PY's																								
				INTRAMURAL PERD						EXTRAMURAL PERD				OSS FEES	TOTAL PERD	INTRAMURAL EC RESOURCES						EXTRAMURAL EC RESOURCES				OSS FEES	TOTAL EC	TOTAL OTHER RES	TASK TOTAL	
		K$	PY	O&M	Capital	Sal/Ben	S/T PY	Adm PY	Contract	G&C	Sal/Ben	SA PY	Adm PY	PERD	$	O&M	Capital	Sal/Ben	S/T PY	Adm PY	Contract	G&C	Sal/Ben	SA PY	Adm PY	EC	$	$	K$	PY
	Subtotal TASK 6	457	1.0	52	0	0	0.0	0.0	245	0	29	0.5	0.0	24	348	0	0	0	0.2	0.1	15	0	0	0.9	0.0	1	16	10	364	1.7

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: DRECT

OERD Project Number: 12201

2. Manager: G.H. HILL
Address: 12th FLOOR, P.V.M.
HULL, QUEBEC

Department EC/EPS
Phone Number: (819) 997-1813

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	913.40	2.0
PERD As spent	331.30	2.0
EC As spent	2.50	0.0
Other As spent	0.00	0.0
Total As spent	333.80	2.0

4. Contractor(s):

5. 85-86 Objectives: To develop hardware, techniques and systems to maximize opportunities for recovery of energy from wastes.

6. Accomplishments/Milestones Achieved:
Four projects valued at $2293K (DRECT contributions - $560K) were completed. Major portions of four active projects valued at $1557K (DRECT contributions - $434.5K) have been completed.

7. Problems Encountered/Resolution?
One project valued at $128K (DRECT contribution - $40K) was terminated due to technical problems. Two projects valued at $3840K (DRECT contribution - $750K) were placed on hold due to economic conditions and technical problems. Two projects valued at $3600K (DRECT contributions - $400K) were postponed.

8. Publications/Reports in 85-86 or in Press:
Four reports were completed. One report has been submitted for publication as part of the Environment Canada technical information series.

9. Recommendations:

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: DRECT   OERD Project Number: 12201

2. Department/Service: EC/EPS
3. Proposed PERD Resources K$ (PY):   913.40 (2.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contrib-ution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
19.20	0.00	121.6	2.0	0.0	183.30	0.00	0.00	0.0	0.0	7.20

Total Panel K$ (PY):   331.30 (2.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contrib-ution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
2.50	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.00

Total EC K$ (PY) =   2.50 (0.0)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) =   0.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: SEWAGE TREATMENT — OERD Project Number: 12202

2. Manager: G.W. SPEIRS — Department EC/EPS
Address: WASTEWATER TECHNOLOGY CENTRE — Phone Number: (416) 336-4745
BURLINGTON, ONTARIO
L7R 4A6

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	166.00	0.0
PERD As spent	283.20	0.0
EC As spent	218.90	3.0
Other As spent	100.00	0.0
Total As spent	602.10	3.0

4. Contractor(s): MCMASTER UNIVERSITY (ENGINEERING SERVICES)
280 MAIN STREET W.
HAMILTON, ONTARIO L8S 4L8

5. 85-86 Objectives: i) demonstrate energy savings in wastewater treatment using automated control
ii) retrofit and apply the methods at the full-scale municipal wastewater treatment plant
iii) disseminate the results to government agencies, consulting & design engineers, and plant operating staff.

6. Accomplishments/Milestones Achieved:
i) Retrofitted Tillsonburg municipal wastewater treatment plant used to provide parallel comparison of automated/manual operation for energy savings and improved performance
ii) Preliminary data confirm aeration energy saving of 30%.
iii) Instrumentation and control equipment installed
iv) Plant monitoring and control software developed and refined
v) Operation audit developed within program refined under UP contract and implemented at first of two municipal wastewater treatment plants
vi) Cooperative agreement signed with U.S. EPA to share and maximize project results.

7. Problems Encountered/Resolution?
Airflow instrumentation failure - replaced; data transfer failure resolved by Bell Canada; more extensive debugging and commissioning than planned; plant upset beyond WTC control; loss of contractor - cannot replace; financial freeze hindered equipment acquisition.

8. Publications/Reports in 85-86 or in Press:
Operational audit, preliminary results and experiences were presented/published as papers at one Canadian (Operators Division, WPCF, Chatham) and two

international conferences (IAWPRC, Houston/Denver and WPCF, Kansas City) in 1985. Presentations to be made at specialized Canadian (AQTE/CSCE, Montreal) and international workshops (WPCF, Los Angeles) on computer control of aeration systems for wastewater treatment. Paper accepted for IAWPRC Biennial Conference, August 1986. Progress reports to the U.S. EPA and Technical Steering Group formed in 1984.

9. Recommendations:
This project should be continued.

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: SEWAGE TREATMENT OERD Project Number: 12202

2. Department/Service: EC/EPS
3. Proposed PERD Resources K$ (PY): 166.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./ Tech.	Admin.				Sci./ Auth.	Admin.	
87.70	55.30	0.0	0.0	0.0	125.70	0.00	0.00	0.0	0.0	14.5

Total Panel K$ (PY): 283.20 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./ Tech.	Admin.				Sci./ Auth.	Admin.	
46.70	33.60	115.5	2.5	0.0	0.00	0.00	23.10	0.5	0.0	0.00

Total EC K$ (PY) = 218.90 (3.0)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
Unsolicited Proposal Fund	30.00	70.00	0.0	0.00	0.0

Total Other K$ (PY) = 100.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: INCINERATOR TEST & EVALUATION OERD Project Number: 12203

2. Manager: A. FINKELSTEIN Department EC/EPS
Address: 351 ST. JOSEPH BLVD. Phone Number: (819) 997-3060
HULL, P.Q. 13TH FLOOR

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	96.00	0.0
PERD As spent	445.00	0.0
EC As spent	890.00	2.8
Other As spent	20.00	0.0
Total As spent	1355.00	2.8

4. Contractor(s): CONCORD SCIENTIFIC CORPORATION
TORONTO, ONTARIO

5. 85-86 Objectives: -Perform combustion test program on Two Stage Incinerator located in PEI
-Develop an R&D program on add-on emission control technology for incinerators

6. Accomplishments/Milestones Achieved:
-Successfully completed test program at the PEI Energy from Waste Facility
-Set up framework for undertaking a pilot scale emission control system with Flakt Canada
-Report on design modifications for 2nd test site

7. Problems Encountered/Resolution?
-Delays occurred due to problem of availability of funding
-Report on combustion results of the PEI incinerator delayed four months due to monumental amount of data to process

8. Publications/Reports in 85-86 or in Press:
1. Design modification to the Quebec City Incinerator
2. Test program format for the 2nd phase of NITEP at the Quebec City Incinerator.

9. Recommendations:

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: INCINERATOR TEST & EVALUATION OERD Project Number: 12203

2. Department/Service: EC/EPS
3. Proposed PERD Resources K$ (PY): 96.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contrib-ution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	445.00	0.00	0.00	0.0	0.0	0.00

Total Panel K$ (PY): 445.00 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contrib-ution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
310.00	0.00	120.0	2.8	0.0	460.00	0.00	0.00	0.0	0.0	0.00

Total EC K$ (PY) = 890.00 (2.8)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
PROVINCE OF ONTARIO	20.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 20.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: DRECT - RECYCLING OERD Project Number: 122A1

2. Manager: GEORGE HILL/J. MYSLICKI Department EC/EPS
Address: TSB/IPB Phone Number: (819) 997-3376

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	45.60	0.0
PERD As spent	45.60	0.0
EC As spent	105.00	1.2
Other As spent	252.00	0.0
Total As spent	402.60	1.2

4. Contractor(s):

5. 85-86 Objectives: To optimize the use of our depleting renewable and non-renewable resources by encouraging increased recycling of waste materials in Canada.

6. Accomplishments/Milestones Achieved:
-Completion of a Technical Manual on the reduction, recycling, treatment and disposal of Biomedical Type A Waste in Canada.
-Completion of a plastic recycling study.
-Support for the Canadian Waste Materials Exchange.
-Completion of the National Manual for the Management of PCB Wastes.

7. Problems Encountered/Resolution?
-None

8. Publications/Reports in 85-86 or in Press:
-Technical Manual for the Management of Biomedical Type A Waste in Canada.
-National Manual for the Management of PCB Wastes.
-Handbook on Plastics Recycling.
-Six bulletins of the Canadian Waste Materials Exchange.

9. Recommendations:
-Target specific groups for the reports to ensure application of results.
Complete report on Waste Oil in FY 86/87

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: DRECT - RECYCLING OERD Project Number: 122A1

2. Department/Service: EC/EPS
3. Proposed PERD Resources K$ (PY): 45.60 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contrib- ution	Sal.& Ben.	(PY)		Fees Paid
			Sci./ Tech.	Admin.				Sci./ Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	45.60	0.00	0.00	0.0	0.0	0.00

Total Panel K$ (PY): 45.60 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contrib- ution	Sal.& Ben.	(PY)		Fees Paid
			Sci./ Tech.	Admin.				Sci./ Auth.	Admin.	
0.00	0.00	72.0	1.0	0.2	33.00	0.00	0.00	0.0	0.0	0.00

Total EC K$ (PY) = 105.00 (1.2)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
DSS - SECTION 38	72.00	0.00	180.0	0.00	0.0

Total Other K$ (PY) = 252.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: PULP AND PAPER

OERD Project Number: 12305

2. Manager: J.L. BETTS
Address: PVM, 13TH FLOOR
HULL, QUEBEC

Department EC/EPS
Phone Number: (613) 997-3713

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	99.00	0.0
PERD As spent	53.12	0.0
EC As spent	11.63	0.2
Other As spent	0.00	0.0
Total As spent	64.75	0.2

4. Contractor(s): BEAK CONSULTANT, MONTREAL, P.Q.
PAPRICAN - POINTE-CLAIRE, P.Q.

5. 85-86 Objectives: Evaluate the potential of a new dewatering machine for dewatering typical paper mill sludges.

6. Accomplishments/Milestones Achieved:
i) Pilor trial report on the new dewatering machine
ii) Preliminary feasibility Report (Final report expected to be completed by 86/87)

7. Problems Encountered/Resolution?
Due to some internal problem, the issuing of the contract was delayed with the result that the final feasibility report could not be completed.

8. Publications/Reports in 85-86 or in Press:
Because of confidentiality, an internal report is to be prepared.

9. Recommendations:
Further pilot plant study

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: PULP AND PAPER   OERD Project Number: 12305

2. Department/Service: EC/EPS
3. Proposed PERD Resources K$ (PY):   99.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
2.00	0.00	0.0	0.0	0.0	50.00	0.00	0.00	0.0	0.0	1.12

Total Panel K$ (PY):   53.12 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	0.00	0.00	11.63	0.2	0.0	0.00

Total EC K$ (PY) =   11.63 (0.2)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) =   0.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: PULP & PAPER - PUMPS FOR WASTE HEAT RECOVERY
OERD Project Number: 123A5

2. Manager: J. BETTS/J. HASKILL
Address: P.V.M., HULL, QUE
Department EC/EPS
Phone Number: (819) 997-3713

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	120.00	0.0
PERD As spent	85.20	0.0
EC As spent	11.95	0.2
Other As spent	0.00	0.0
Total As spent	97.15	0.2

4. Contractor(s): PAPRICAN
POINTE CLAIRE, QUE.

5. 85-86 Objectives:
1) To assess state-of-the-art RE: Heat Pump Technology
2) To assess the vaious streams within the industry where heat pump technology would be practicable.

6. Accomplishments/Milestones Achieved:
Analysis of the industry processes has identified the white water stream of a stone groundwood operation as a potential source of heat recovery. A preliminary review has identified areas within the 'Kraft' process, as well. In addition, an assessment of the characteristics of the commercially available working fluids; freon R113, R114, and methanol has been started re: suitability in high temperature applications.

7. Problems Encountered/Resolution?
1) Staffing problem at Paprican delayed start of program but presents no major difficulty.

8. Publications/Reports in 85-86 or in Press:
N/A

9. Recommendations:
N/A

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: PULP & PAPER - PUMPS FOR WASTE HEAT RECOVERY OERD Project Number: 123A5
2. Department/Service: EC/EPS
3. Proposed PERD Resources K$ (PY): 120.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
5.20	0.00	0.0	0.0	0.0	78.30	0.00	0.00	0.0	0.0	1.70

Total Panel K$ (PY): 85.20 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	0.00	0.00	11.95	0.2	0.0	0.00

Total EC K$ (PY) = 11.95 (0.2)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 0.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: HYDROGEOLOGICAL ASPECTS OF BITUMEN/HEAVY OIL RECOVERY

OERD Project Number: 24102

2. Manager: MR. V. MARWAHA

Address: ENVIRONMENT CANADA, EPS
4999 - 98 AVENUE
EDMONTON, ALBERTA

Department EC/EPS

Phone Number: (403) 468-8030

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	200.00	0.0
PERD As spent	31.00	0.0
EC As spent	0.00	0.0
Other As spent	0.00	0.0
Total As spent	31.00	0.0

4. Contractor(s): ALBERTA RESEARCH COUNCIL
6TH FLOOR, TERRACE PLAZA
4445 CALGARY TRAIL SOUTH
EDMONTON, ALBERTA T6H 5R7

5. 85-86 Objectives:

Measure equilibrium constants for phenol absorption and desorption; derive mathematical representation of partition co-efficients for application in the transport model.

6. Accomplishments/Milestones Achieved:

- Analysed wastewaters from 12 different oil sands and heavy oil field pilots including in-situ steam, combustion or combined steam/combustion recovery processes.
- Measured phenol levels by GC and 14C activity and found they were in agreement.
- Found values of partition co-efficients for phenol strongly influenced by; the solid to liquid ratio, the ionic strength of the solution and the rock type.
- Discovered no changes in phenol levels in solution or sediment for the duration of the experiment, indicating that adsorption was a very fast process while desorption was negligible or of longer duration.

7. Problems Encountered/Resolution?

8. Publications/Reports in 85-86 or in Press:

9. Recommendations:

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: HYDROGEOLOGICAL ASPECTS OF BITUMEN/HEAVY OIL RECOVERY — OERD Project Number: 24102
2. Department/Service: EC/EPS
3. Proposed PERD Resources K$ (PY): 200.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contrib-ution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	31.00	0.00	0.00	0.0	0.0	0.00

Total Panel K$ (PY): 31.00 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contrib-ution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.00

Total EC K$ (PY) = 0.00 (0.0)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 0.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: OIL SANDS TAILINGS - WATER TREATMENT — OERD Project Number: 24104

2. Manager: MR. V. MARWAHA — Department EC/EPS

Address: ENVIRONMENT CANADA, EPS
4999 -98 AVENUE
EDMONTON, ALBERTA

Phone Number: (403) 468-8030

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	250.00	0.0
PERD As spent	35.66	0.0
EC As spent	0.00	0.0
Other As spent	0.00	0.0
Total As spent	35.66	0.0

4. Contractor(s): A) DR. J.D. SCOTT
DEPARTMENT OF CIVIL ENGINEERING
UNIVERSITY OF ALBERTA
B) ZENON EVIRONMENTAL INC.
845 HARRINGTON COURT
BURLINGTON, ONTARIO
L7N 3P3

5. 85-86 Objectives:
- To develop cost-effective treatment methods for the tailings waters
- To identify the potential geomechanically induced environmental impacts resulting from SATAC (shaft and tunnel access concept) - a new technology for oil sands extractions.

6. Accomplishments/Milestones Achieved:
- Through laboratory-based bench-scale screening studies, examined treatment alternatives including; reverse osmosis, carbon adsorption, ultrafiltration, acidification, co-agulation, flocculation and biological treatment.
- Carried out preliminary economic analyses of the most promising alternatives to assist in selecting the most cost-effective options for further study.
- Identified potentially major and widespread impacts from SATAC as a result of unintentional fracturing and the migration of organic chemicals through the groundwater system and into regional aquifers.

7. Problems Encountered/Resolution?
- Before proceeding further, need to know; the options and criteria that the provincial regulators consider appropriate for each tar sands plant, and the reasonable cost of treatment that can be considered appropriate from industry's viewpoint.

8. Publications/Reports in 85-86 or in Press:

a) Final report expected in April, 1986.

b) Interim report for the SATAC environmental study to be finalized by August 1986.

9. Recommendations:

-Need for greater baseline data prior to the commencement of a SATAC operation.

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: OIL SANDS TAILINGS - WATER TREATMENT   OERD Project Number: 24104
2. Department/Service: EC/EPS
3. Proposed PERD Resources K$ (PY): 250.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contrib-ution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	35.66	0.00	0.00	0.0	0.0	0.00

Total Panel K$ (PY): 35.66 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contrib-ution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.00

Total EC K$ (PY) = 0.00 (0.0)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 0.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: TREATMENT OF AQUEOUS EFFLUENTS FROM INSITU OPERATIONS   OERD Project Number: 24105
2. Manager: J.W. SCHMIDT   Department EC/EPS
Address: WASTEWATER TECHNOLOGY CENTRE   Phone Number: (416) 336-4541
BURLINGTON, ONTARIO

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	256.00	1.0
PERD As spent	468.70	1.0
EC As spent	291.00	5.0
Other As spent	0.00	0.0
Total As spent	759.70	6.0

4. Contractor(s): (a) Dearborn Environmental Consultants, (b) CH2M Hill, (c) D. Rogers, (d) J. Dickson, (e) Computernick Inc. (f) Angus Employment (2) (g) Ian Martin and Assoc., (2) (h) Resources Conservation Company

5. 85-86 Objectives: (a) Characterize produced waters from most in-situ sites to develop a comprehensive data base.(b) Complete pilot scale evaluation of the removal of oil and suspended solids by granular media filtration. (c) Develop and demonstrate technology(ies) for removal of total dissolved solids and silica. (d) Develop an integrated program for field testing of filtration, TDS and organics removal

6. Accomplishments/Milestones Achieved:

(a) Two hundred and fifty samples of produced water from 17 new sites have been characterized for 35 parameters. Preparation of a data base is under way. Protocols for screening of filter aids and for testing the filterability of produced water were developed and evaluated.

(b) Pilot scale studies on the filtration of a synthetic produced water have been completed.

(c) Laboratory scale studies on vapour compression evaporation and crystallization for total dissolved solids removal have been completed. A literature study on silica removal technologies has been completed.

(d) A field program for testing filtration of produced water at Husky-Lloydminster has been developed.

(e) A tentative agreement for joint participation in field studies incorporating removal of oil and suspended solids, and total dissolved solids has been reached with AOSTRA and four heavy oil operators in the Lindbergh area.

7. Problems Encountered/Resolution?
Good progress continues to be made.

8. Publications/Reports in 85-86 or in Press:
Eight reports have been prepared, of which six are available for perusal. In addition, a more extensive proposal on field studies for the Lindbergh area is available.

9. Recommendations:
The project, as outlined, will be continued. However, with the recent fall in world oil prices, some rescheduling may be necessary.

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: TREATMENT OF AQUEOUS EFFLUENTS FROM INSITU OPERATIONS   OERD Project Number: 24105
2. Department/Service: EC/EPS
3. Proposed PERD Resources K$ (PY): 256.00 (1.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
88.30	51.30	27.2	0.8	0.0	289.20	0.00	6.80	0.2	0.0	5.9

Total Panel K$ (PY): 468.70 (1.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
30.00	30.00	184.8	4.0	0.0	0.00	0.00	46.20	1.0	0.0	0.00

Total EC K$ (PY) = 291.00 (5.0)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 0.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: TREATMENT OF OIL/WATER/SAND IN-SITU SLUDGES
OERD Project Number: 24106

2. Manager: R. SCROGGINS
Address: OTTAWA, ONTARIO
K1A 1C8
Department EC/EPS
Phone Number: (819) 997-1223

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	105.00	0.0
PERD As spent	105.20	0.0
EC As spent	22.10	0.2
Other As spent	0.00	0.0
Total As spent	127.30	0.2

4. Contractor(s):
1) KANANASKIS CENTRE FOR ENVIRONMENTAL RESEARCH, CALGARY ALBERTA
2) AGRICULTURE CANADA, SWIFT CURRENT, SASKATCHEWAN
3) BBT GEOTECHNICAL CONSULTANTS LTD. LLYOYDMINSTER, SASK.
4) WASTEWATER TECHNOLOGY CENTRE, BULINGTON, ONTARIO

5. 85-86 Objectives:
-Finish laboratory and greenhouse studies, complete alteration to asphalt incorporator,undertake growth chamber and greenhouse experiments, site selection for field studies 1986, formulate and test various waste sludge/asphalt /aggregate mixtures for possible use as roadway surfacing material, complete construction of oil/sludge microcosms for waste fate research studies.

6. Accomplishments/Milestones Achieved:
-established a federal/provincial/industry technical committee to coordinate all heavy oil sludge waste management research
-all 85/86 objectives completed

7. Problems Encountered/Resolution?
none

8. Publications/Reports in 85-86 or in Press:
-Phase 1 final report on laboratory and greehouse DIMR land treatment studies submitted
-final draft report on incorporation of waste sludges into asphalt mixes

9. Recommendations:
All studies are continuing in 86/87.

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: TREATMENT OF OIL/WATER/SAND IN-SITU SLUDGES   OERD Project Number: 24106
2. Department/Service: EC/EPS
3. Proposed PERD Resources K$ (PY):   105.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
1.50	0.00	0.0	0.0	0.0	103.70	0.00	0.00	0.0	0.0	0.00

Total Panel K$ (PY):   105.20 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
14.10	0.00	0.0	0.0	0.0	0.00	0.00	8.00	0.2	0.0	0.00

Total EC K$ (PY) =   22.10 (0.2)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) =   0.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: ABATEMENT OF ACID GAS

OERD Project Number: 24107

2. Manager: R. ORR
Address: 2ND FLOOR, TWIN ATRIA
4999-98TH AVENUE
EDMONTON, ALBERTA

Department EC/EPS
Phone Number: (403) 420-2542

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	250.00	0.0
PERD As spent	0.00	0.0
EC As spent	0.00	0.0
Other As spent	0.00	0.0
Total As spent	0.00	0.0

4. Contractor(s):

5. 85-86 Objectives:
Following the advice of the industry/government technical committee, the project was cancelled.

6. Accomplishments/Milestones Achieved:

7. Problems Encountered/Resolution?

8. Publications/Reports in 85-86 or in Press:

9. Recommendations:

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: ABATEMENT OF ACID GAS OERD Project Number: 24107

2. Department/Service: EC/EPS
3. Proposed PERD Resources K$ (PY): 250.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.0

Total Panel K$ (PY): 0.00 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.0

Total EC K$ (PY) = 0.00 (0.0)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 0.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: ENVIROM'L PROTEC'N CRITERIA FOR COAL MINING & PROC FACIL. OERD Project Number: 24201

2. Manager: W.B. BLAKEMAN Department EC/EPS
Address: MINING DIV./IPB/EPPD Phone Number: (613) 997-2270

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	124.00	1.0
PERD As spent	125.00	1.0
EC As spent	13.70	0.2
Other As spent	25.00	0.0
Total As spent	163.70	1.2

4. Contractor(s): MS. S. LEASK - FERNIE, B.C. (24201-A)
NORECOL ENVIRONMENTAL CONSULTANTS VANCOUVER (24201-A)
W.B. BARRIE & ASSOCIATES - OTTAWA
OCEAN CHEM GROUP - HALIFAX

5. 85-86 Objectives:
- Complete Report;i)characterizing emissions from 2 coal Driers in B.C.; ii)on present and projected water usage by Western Coal Industry; iii)on groundwater impacts of present and future Western Coal Mining Industry.
- Complete analysis of waste products from U.S. sulphur removal process
- Finalize graphics and internal review of Nat'l Coal Waste Water Study

6. Accomplishments/Milestones Achieved:
- Coal drier emission reports completed and submitted to OERD.
- Present & future water use report - in departmental editing and translation
- Report on groundwater impacts of present and future Western Coal Mining Industry - in departmental editing and translation.
- Set date for Annual coal production and Trans Working Group Meeting, Vancouver - January, 1986 for tech transfer to OGD's, provinces & Industry.

7. Problems Encountered/Resolution?
- Demands of Pearse Commission for drafting services delayed production of grahics for reports
- Larger than anticipated allocation for salary and benefits for the one PY (ENG -3) reduced O&M resources available for planned programs.

8. Publications/Reports in 85-86 or in Press:
-Reports characterizing Emissions from Coal Drier at Bull Moose and Westar Prep Plants in B.C. submitted to OERD.
-Report characterizing Emissions from Luscar - Sterco Coal Drier - Coal Valley Alberta - in prep.
-Reports on present/future water use and Groundwater impacts - Western Coal

Industry - in prep. & translation.

9. Recommendations:
none

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: ENVIROM'L PROTEC'N CRITERIA FOR COAL MINING & PROC FACIL. OERD Project Number: 24201
2. Department/Service: EC/EPS
3. Proposed PERD Resources K$ (PY): 124.00 (1.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
37.90	0.00	55.0	1.0	0.0	27.50	0.00	0.00	0.0	0.0	4.60

Total Panel K$ (PY): 125.00 (1.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	13.7	0.2	0.0	0.00	0.00	0.00	0.0	0.0	0.00

Total EC K$ (PY) = 13.70 (0.2)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
DSS	25.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 25.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: SLURRY TRANSPORTATION OERD Project Number: 24204

2. Manager: C. WACHMANN Department EC/EPS
Address: P.V.M., HULL, QUE. Phone Number: (819) 997-1612

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	55.00	0.0
PERD As spent	0.00	0.0
EC As spent	0.00	0.0
Other As spent	0.00	0.0
Total As spent	0.00	0.0

4. Contractor(s): MONENCO CONSULTANTS LTD.
CALGARY, ALBERTA

5. 85-86 Objectives:
1) Assess potential environmental problems from accidents or system malfunction in using the existing Trans Mountain Pipe Line Company's crude oil pipeline for batch-transport of crude oil and coal slurries.
2) Develop answers to these problems and recommend appropriate control measures.

6. Accomplishments/Milestones Achieved:
N/A

7. Problems Encountered/Resolution?
1) Trans Mountain's participation and comments delayed until December 1985; then supportive.
2) Subsequent delays in issue of contract in approvals process.
3) Study held up by funding freeze.

8. Publications/Reports in 85-86 or in Press:
N/A

9. Recommendations:
Continue study in 1986/87 in accordance with Terms of Reference already issued and approved at reduced funding level of $11.0K.

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: SLURRY TRANSPORTATION OERD Project Number: 24204

2. Department/Service: EC/EPS
3. Proposed PERD Resources K$ (PY): 55.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.00

Total Panel K$ (PY): 0.00 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.00

Total EC K$ (PY) = 0.00 (0.0)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 0.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: FLUE GAS DESULPHURIZATION/DEV. OF RECOMMENDED WATER-MGT PRAC.

OERD Project Number: 24303

2. Manager: G.G. ROSS

Address: ELECTRIC POWER SECTION
INDUSTRIAL PROGRAMS BRANCH
13TH FLOOR, PLACE VINCENT MASSEY

Department EC/EPS
Phone Number: (819) 997-1222

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	108.00	1.0
PERD As spent	73.40	1.0
EC As spent	0.00	0.0
Other As spent	10.10	0.0
Total As spent	83.50	1.0

4. Contractor(s): ONTARIO RESEARCH FOUNDATION
SHERIDAN PARK RESEARCH COMMUNITY
MISSISSAUGA, ONTARIO L5K 1B3

5. 85-86 Objectives:
(1) Assess applicability of physical strength criteria to FGD wastes
(2) Assess feasibility/cost of meeting physical strength criteria
(3) Assess methods for reclamation of FGD waste disposal sites

6. Accomplishments/Milestones Achieved:
-Completed study of the applicability of physical strength criteria to power plant wastes (FGD solids and ash). The report's findings were immediately applicable and were used in reviewing a proposal for a new ash disposal site for Nova Scotia Power's Point Tupper oil to coal conversion project.
-PERD-FGD reports distributed during 85/86 comprised the major references used in a Canadian Electrical Association study of FGD wastewaters. EC was asked to review and comment on the CEA study. Proposals were received on a RFP for the FGD waste reclamation study (study 3 above).

7. Problems Encountered/Resolution?
PERD budget cuts for 85/86 made it necessary to cut study (2) from the program. The February 86 spending freeze prevented work on study (3), which was ready to proceed at the time of the freeze.

8. Publications/Reports in 85-86 or in Press:
Manuscript reports entitled "Technical/Economic Assessment of Closed Process Water Loop Systems for Flue Gas Desulphurization" and "An Evaluation of Flue Gas Desulphurization Wastewater Treatment by Mechanical Evaporation" were distributed to contacts in Canada, U.S.A. and Europe. Additional copies were requested by industry and consultants in the U.S.A. EC has been asked to present a paper covering these topics at the 1986 Joint Power Generation Conference, Portland, Oregon.

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: FLUE GAS DESULPHURIZATION/DEV. OF RECOMMENDED WATER-MGT PRAC. OERD Project Number: 24303
2. Department/Service: EC/EPS
3. Proposed PERD Resources K$ (PY): 108.00 (1.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contrib-ution	Sal.& Ben.	(PY)		Fees Paid
			Sci./ Tech.	Admin.				Sci./ Auth.	Admin.	
8.40	0.00	0.0	0.0	0.0	10.00	0.00	55.00	1.0	0.0	0.00

Total Panel K$ (PY): 73.40 (1.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contrib-ution	Sal.& Ben.	(PY)		Fees Paid
			Sci./ Tech.	Admin.				Sci./ Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.00

Total EC K$ (PY) = 0.00 (0.0)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
DSS UP FUND	10.10	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 10.10 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: FBC TECHNOLOGY-ASSESSMENT OF WATER POLLUTION POTENTIAL

OERD Project Number: 24304

2. Manager: G.G. ROSS

Department EC/EPS

Address: ELECTRIC POWER SECTION
INDUSTRIAL PROGRAMS BRANCH
13TH FLOOR, PLACE VINCENT MASSEY

Phone Number: (819) 997-1222

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	157.00	0.0
PERD As spent	110.40	0.0
EC As spent	8.00	0.2
Other As spent	0.00	0.0
Total As spent	118.40	0.2

4. Contractor(s): M.M. DILLON LTD.
BOX 1850, STATION A
WILLOWDALE, ONTARIO M2N 6H5

5. 85-86 Objectives:
(1) Conduct study to delineate FBC solid waste management problems
(2) Monitor CANMET Summerside AFBC demonstration unit
(3) Development assessment program for 20MW Chatham FBC demonstration
(4) Publish reports from previous work.

6. Accomplishments/Milestones Achieved:
-Completion of two reports;
-Study of Summerside ash dump groundwater/leachate completed by Atlantic Region with PERD/FBC funding;
-C&P participation in planning for the Chatham FBC project resulted in greater emphasis on water management aspects. Data from past and current PERD/FBC studies were influential in this;

7. Problems Encountered/Resolution?
Delays in completing WTC work resulted in additional funding requirements. February 86 spending freeze delayed initiation of FBC leachate/air reaction study to FY 86/87 and delayed publication of several reports.

8. Publications/Reports in 85-86 or in Press:
-A report entitled "Preliminary Evaluation of AFBC Solid Waste Properties, 1982/83" was published.
-Study entitled "Unique Properties of Atmospheric Fluidized Bed Combustion (AFBC) Residues" was completed and the report edited and submitted to publication
-Reports on 83/84 and 84/85 WTC-FBC work, organics in combustion ashes, high CaO content wastes, and combustion wasted screening tests were submitted for publication.

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: FBC TECHNOLOGY-ASSESSMENT OF WATER POLLUTION POTENTIAL OERD Project Number: 24304
2. Department/Service: EC/EPS
3. Proposed PERD Resources K$ (PY): 157.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contrib-ution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
42.20	0.00	0.0	0.0	0.0	66.80	0.00	0.00	0.0	0.0	1.40

Total Panel K$ (PY): 110.40 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contrib-ution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	0.00	0.00	8.00	0.2	0.0	0.00

Total EC K$ (PY) = 8.00 (0.2)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 0.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: ANAEROBIC DIGESTION OERD Project Number: 43604

2. Manager: E.R. Hall
Address: Wastewater Technology Centre
P.O. Box 5050
Burlington, Ont., L7R 4A6

Department EC/EPS
Phone Number: (416) 336-4715

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	172.00	0.0
PERD As spent	156.40	0.0
EC As spent	197.80	3.5
Other As spent	11.60	0.0
Total As spent	365.80	3.5

4. Contractor(s): L.A. Cornacchio
Dundas, Ontario

5. 85-86 Objectives: (i) initiate anaerobic screening program for pulp and paper wastewaters, (ii) complete pilot studies for MacMillan Bloedel, (iii) initiate studies on automatic control of anaerobic reactors, (iv) continue provision of technical assistance to industry and OGDs.

6. Accomplishments/Milestones Achieved:
-MacBlo pilot study successfully completed - project moved to demo phase at mill site - similar studies planned at request of Quesnel River Pulp, Spruce Falls Power and Paper, and Paprican.
-anaerobic screening studies 85% completed
-process control studies initiated
-due to higher profile of anaerobic treatment generated by EC, the WTC responded to requests for technical assistance for approx 10 industrial companies and OGDs (including Lake Utopia Paper, Consolidated-Bathurst, Cascades Paper, Domtar, Bow Valley Resources, Nabisco Brands, Province of Manitoba, City of Portage la Prairie, Energy Mines and Resources Canada, etc.)

7. Problems Encountered/Resolution?
-all programs are behind schedule as a result of spending freeze
-no additional problems encountered

8. Publications/Reports in 85-86 or in Press:
7 publications in total - 3 Canadian, 2 U.S., 2 Overseas
1985. Biofilm reactors in anaerobic wastewater treatment. Proc. Seminario sui Trattamenti Biologici Avanzati, Consiglio Nazionale Delle Ricerche, Rome, November 28-29.
1986. Hall, E.R., C.F. Prong, P.D. Robson and A.J. Chmelauskas. Evaluation of anaerobic treatment for NSSC wastewater. Proc. 1986 Environmental Conference, TAPPI, April 23-24, New Orleans LA.

1986. Oleszkiewicz, J.A., E.R. Hall and J.Z. Oziemblo. Performance of laboratory anhybrid reactors with varying depths of media. Submitted to Environmental Technology Letters.
1986. Cornacchio, L.A., E.R. Hall and J.T. Trevors. Anaerobic biodegradation estimates for industrial wastewaters. Presented at 21st Canadian Symposium on water Pollution Research, april 30, Burlington, Ontario, Canada.
1986. Goodin, J.D., E.R. Hall and M.S. Manocha. Phosphatase activity and ATP content as indicators of anaerobic treatment process instability.
1986. Young, D.N., E. Vale and E.R. Hall. Pilot scale anaerobic biomass acclimation studies with a coal liquefaction wastewater. Int'l Conf. on Innovative Biological Treatment of Toxic Wastewaters, Arlington, Virginia.
1986. Jovanovic, M., K.L. Murphy and E.R. Hall. Parallel evaluation of high rate anaerobic treatment processes : retention time and concentration effects. Presented at EWPCA Conf. Anaerobic Wastewater Treatment, amsterdam, September 15-19.

9. Recommendations:
Continue program as proposed

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: ANAEROBIC DIGESTION OERD Project Number: 43604

2. Department/Service: EC/EPS
3. Proposed PERD Resources K$ (PY): 172.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY) Sci./Tech.	(PY) Admin.	Contract	Contribution	Sal.& Ben.	(PY) Sci./Auth.	(PY) Admin.	Fees Paid
18.70	0.00	0.0	0.0	0.0	133.00	0.00	0.00	0.0	0.0	4.70

Total Panel K$ (PY): 156.40 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY) Sci./Tech.	(PY) Admin.	Contract	Contribution	Sal.& Ben.	(PY) Sci./Auth.	(PY) Admin.	Fees Paid
0.00	36.10	138.6	3.0	0.0	0.00	0.00	23.10	0.5	0.0	0.00

Total EC K$ (PY) = 197.80 (3.5)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
MOSST BIOTECHNOLOGY	11.60	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 11.60 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: DEMONSTRA'N OF LIQUID FUEL PRODUC'N FROM SEWAGE SLUDGE
OERD Project Number: 51202

2. Manager: T.R. BRIDLE
Address: WASTEWATER TECHNOLOGY CENTRE
BURLINGTON, ONTARIO
Department EC/EPS
Phone Number: (416) 336-4720

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	450.00	0.0
PERD As spent	449.70	0.0
EC As spent	82.90	1.6
Other As spent	230.00	0.0
Total As spent	762.60	1.6

4. Contractor(s):
1. DEARBORN ENVIRONMENTAL CONSULTANTS, MISSISSAUGA
2. CHEMICAL ENGINEERING RESEARCH CONSULTANTS, TORONTO
3. PETRO SUN INTERNATIONAL, MONTREAL
4. PROCTOR & REDFERN LTD., TORONTO

5. 85-86 Objectives:
To continue to generate process information on 1 kg/h PDU, to assess environmental impact of the technology and facilitate commercialization by commissioning a 1 tonne/day pilot plant.

6. Accomplishments/Milestones Achieved:
(a) generated detailed process design information for the 1 tpd pilot plant
(b) process and analytical equipment to assess environmental input installed and operational
(c) tentative upgrading process (to produce diesel fuel) identified
(d) one tonne per day pilot plant under construction

7. Problems Encountered/Resolution?
Construction of demonstration plant (at least 25 tpd) postponed subject to generation of pilot plant data.

8. Publications/Reports in 85-86 or in Press:
1) Dearborn Contract report (Interim) on environmental assessment.
2) "Canadian Advances in Sludge Technology" by H.W. Campbell et al.

9. Recommendations:
-Project proceeding well,continued support warranted; anticipated that technology licensed in FY86/87; additional resources required($150K) in FY86/87.

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: DEMONSTRA'N OF LIQUID FUEL PRODUC'N FROM SEWAGE SLUDGE OERD Project Number: 51202
2. Department/Service: EC/EPS
3. Proposed PERD Resources K$ (PY): 450.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contrib-ution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
41.30	42.40	0.0	0.0	0.0	347.70	0.00	0.00	0.0	0.0	18.30

Total Panel K$ (PY): 449.70 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contrib-ution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
4.00	5.00	50.8	1.0	0.1	0.00	0.00	23.10	0.5	0.0	0.00

Total EC K$ (PY) = 82.90 (1.6)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
DSS	230.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 230.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: POLLUT'N ABATEM'T TECH-BITUMEN HVY OIL/CL COPRO UPGRD&NAT GAS — OERD Project Number: 57101
2. Manager: R. SCROGGINS — Department EC/EPS
   Address: OTTAWA, ONTARIO — Phone Number: (819) 997-1223
   K1A 0C8

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	192.00	1.0
PERD As spent	180.60	1.0
EC As spent	0.00	0.1
Other As spent	0.00	0.0
Total As spent	180.60	1.1

4. Contractor(s):
   1. MONENCO (Calgary) - characterization & envt'l significance of gas plant sludges (PhaseII)
   2. ZENON ENVT'L (Burlington) - devel. of analytical methods for measurement of PAH's in complex sludges.

5. 85-86 Objectives:
-to continue assessment of envt'l implications and control technologies bitumen/heavy oil upgraders and liquefied petroleum gas (LPG) processing
-complete preliminary field sampling and analysis of sludges from one LPG processing plant.

6. Accomplishments/Milestones Achieved:
-300 copies of joint Canadian Petroleum Association/Environment Canada gas plant sludge characterization manual circulated to industry and government distributed.
-Full time Environment Canada representation on CPA research committee, the Environmental Advisory research council.
-Final report on PAh analytical methods for oily sludges circulated to interested industry and government parties.
-Phase II field component of CPA/EC gas plant sludge characterization study completed.

7. Problems Encountered/Resolution?
-Sampling of sludges as part of the preliminary gas plant field program was delayed five months due to lengthy negotiations on information confidentiality and the unavailability of a suitable plant for sampling.

8. Publications/Reports in 85-86 or in Press:
Publications: CPA/EC Report: Gas Sludge Characterization: An Information Review.
EPS Manuscript Series Report: Analytical Method for Character-

ization of PAH's in Complex Oily Sludges.

9. Recommendations:
The research described above represents the fourth year component of the nine-year overall research program.

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: POLLUT'N ABATEM'T TECH-BITUMEN HVY OIL/CL COPRO UPGRD&NAT GAS   OERD Project Number: 57101
2. Department/Service: EC/EPS
3. Proposed PERD Resources K$ (PY): 192.00 (1.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	123.60	0.00	57.00	1.0	0.0	0.00

Total Panel K$ (PY): 180.60 (1.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.1	0.0	0.00

Total EC K$ (PY) = 0.00 (0.1)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 0.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: DEV PROCESS TECH RE TREATMENT WASTE WATERS FRM COAL LIQUEF'N

OERD Project Number: 57103

2. Manager: DR. HENRYK MELCER

Department EC/EPS

Address: EVIRONMENT CANADA
WASTEWATER TECHNOLOGY CENTRE
P.O. BOX 5050, L7R 4A6

Phone Number: (416) 336-4546

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	107.00	1.0
PERD As spent	135.80	1.0
EC As spent	23.40	0.5
Other As spent	0.00	0.0
Total As spent	159.20	1.5

4. Contractor(s): CANVIRO CONSULTANTS
178 LOUISA ST.
KITCHENER, ONTARIO N2H 5M5

5. 85-86 Objectives:
i) verification of process design parameters for coupled biological fluidized bed
ii) assessment of dynamic characteristics of fluidized bed
iii) preliminary characterization of wastewaters from upgrader technologies.

6. Accomplishments/Milestones Achieved:
i) Steady-state characterization of process design characteristics of fluidized bed system completed
ii) Assessment of dynamic characterization, 75% completed
iii) Chemical characterization of one upgrader wastewater completed
iv) Treatability assessment of same wastewater - aerobic completed, anaerobic 75% complete.

7. Problems Encountered/Resolution?
i) Chemical analysis of fluidized bed feed wastewater in error - delayed project by 3 months. Analytical problem resolved.
ii) Financial freeze delayed completion of dynamic work and anaerobic characterization.

8. Publications/Reports in 85-86 or in Press:
Final Report on Steady-state process characterization of fluid bed completed.

9. Recommendations:
Project should continue.

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: DEV PROCESS TECH RE TREATMENT WASTE WATERS FRM COAL LIQUEF'N   OERD Project Number: 57103
2. Department/Service: EC/EPS
3. Proposed PERD Resources K$ (PY): 107.00 (1.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	19.00	37.0	1.0	0.0	77.10	0.00	0.00	0.0	0.0	2.70

Total Panel K$ (PY): 135.80 (1.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.40	0.00	23.0	0.3	0.0	0.00	0.00	0.00	0.2	0.0	0.00

Total EC K$ (PY) = 23.40 (0.5)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 0.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: TREATMENT TECHNOLOGIES-OIL & GAS MARINE PRODUCT'N WASTES — OERD Project Number: 67201
2. Manager: K. KARR — Department EC/EPS
   Address: 13TH FLOOR, PVM — Phone Number: (819) 953-1125
   HULL, QUEBEC

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	60.00	0.0
PERD As spent	28.90	0.0
EC As spent	0.00	0.3
Other As spent	0.00	0.0
Total As spent	28.90	0.3

4. Contractor(s):

5. 85-86 Objectives:
- Recommmend treatment technologies and envt'l technologies worthy of further coordination by the Government of Canada.
- Specific studies addressing R&D areas to be completed by working in conjuction with industry.

6. Accomplishments/Milestones Achieved:
- Trip to Washington and Gulf of Mexico (Texas, Louisiana, Alabama) to observe offshore waste treatment methods and regulations
- Trip to North Sea (Norway, U.K. Netherlands)
- Code of Practice for the Treatment and Disposal of Offshore Petroleum Industry Wastes to be completed by end of March.

7. Problems Encountered/Resolution?
- Canadian engineering consultants not able to provide information required - resolution work done in-house with extensive consultation with regulators in other countries; 1986 spending freeze caused cancellation of parts of research phase (lapsed 15.6K, transferred 15.5K to 67237)

8. Publications/Reports in 85-86 or in Press:
- U.S. - Gulf of Mexico trip report - available May 1986.
- North Sea trip report - available May 1986.
- 1st draft Code of Practice for Treatment and Disposal of Offshore Petroleum Indutry Wastes -- draft completed April 1986.

9. Recommendations:
- Review Code of Practice; research on oily water coalescers and alternative produced water treatment processes, investigate re-injection of produced water

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: TREATMENT TECHNOLOGIES-OIL & GAS MARINE PRODUCT'N WASTES   OERD Project Number: 67201
2. Department/Service: EC/EPS
3. Proposed PERD Resources K$ (PY): 60.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
28.90	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.00

Total Panel K$ (PY): 28.90 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.2	0.1	0.00	0.00	0.00	0.0	0.0	0.00

Total EC K$ (PY) = 0.00 (0.3)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 0.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: RESIDUAL TOXICITY AND DEBRIS - OFFSHORE WELL SITES   OERD Project Number: 67203

2. Manager: WAYNE BARCHARD   Department EC/EPS
Address: 45 ALDERNEY DRIVE   Phone Number: (902) 426-8301
DART., N.S.

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	20.00	0.0
PERD As spent	18.00	0.0
EC As spent	0.00	0.0
Other As spent	0.00	0.0
Total As spent	18.00	0.0

4. Contractor(s): SEA RAVEN RESOURCES LTD.
HALIFAX, N.S.
S. MAHON LTD.
DATMOUTH, N.S.

5. 85-86 Objectives:
-publish report on bioavailability of metals from drill fluids
-publish report on debris of concern to commercial fisheries.

6. Accomplishments/Milestones Achieved:

1. Seabed obstructions to Commercial Fisheries in Areas of Petroleum Exploration off Eastern Canada.
   -based on both detailed surveys of areas of intensive exploration and regional surveys of information provided by fishermen, it is concluded that there has been no significant impact on commercial fishing from debris originating from petroleum exploration.
2. Trace Metals from Drilling Fluid Components released into the Canadian Marine Environment.
   -based on field surveys of areas around wells drilled up to four years previously, and laboratory experiments to determine the bioavailable components of drilling fluids, it was concluded that surface sedimentology in the vicinity of projects is the major determinant of accumulation and persistance of routine rig discharges. Given suitable conditions, barium and chromium maybe bioaccumulated in endemic benthos. A weak hydrochloric acid leach was determined to be the best assay of potential bioavailability of metals from routine rig discharges.

7. Problems Encountered/Resolution?
Federal government spending freeze precluded publication of the reports. Proposed solution is to publish the reports in 1986/87 utilizing PERD funding.

8. Publications/Reports in 85-86 or in Press:

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: RESIDUAL TOXICITY AND DEBRIS - OFFSHORE WELL SITES   OERD Project Number: 67203
2. Department/Service: EC/EPS
3. Proposed PERD Resources K$ (PY): 20.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	18.00	0.00	0.00	0.0	0.0	0.00

Total Panel K$ (PY): 18.00 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.00

Total EC K$ (PY) = 0.00 (0.0)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 0.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: NORTHERN RESOURCE RECOVERY AND RECYCLING
OERD Project Number: 67204

2. Manager: R.S. HOWARTH
Address: EPS/NWT DISTRICT OFFICE
P.O. BOX 370
YELLOWKNIFE, N.W.T. X1A 2N3
Department EC/EPS
Phone Number: (403) 873-3456

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	40.00	0.0
PERD As spent	20.00	0.0
EC As spent	0.00	0.0
Other As spent	0.00	0.0
Total As spent	20.00	0.0

4. Contractor(s): FURGUSON, SIMEK, CLARK
P.O. BOX 1777 4910-53 STREET
YELLOWKNIFE, N.W.T.
X1A 2P4

5. 85-86 Objectives:
Examine local economics and practical design problems associated with the design and construction of a heat recovery solid waste incinerator for the City of Yellowknife, N.W.T.

6. Accomplishments/Milestones Achieved:
A study was completed which examined the cost-effectiveness of an incineration facility for municipal solid waste with recovery and sale of waste heat in the City of Yellowknife, NWT. The economic analysis compared total costs for incineration with total costs for continuing the present method of modified landfill for a planning horizon of 15 years. It was determined that incineration was more cost-effective at discount rates of 6.9% or less.

7. Problems Encountered/Resolution?
N/A

8. Publications/Reports in 85-86 or in Press:
Ferguson, Simek, Clark. 1986. Yellowknife Incineration Study - February, 1986. Prepared for the Environmental Protection Service, NWT District Office. 46 pp.

9. Recommendations:

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: NORTHERN RESOURCE RECOVERY AND RECYCLING
OERD Project Number: 67204
2. Department/Service: EC/EPS
3. Proposed PERD Resources K$ (PY): 40.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
4.60	0.00	0.0	0.0	0.0	14.80	0.00	0.00	0.0	0.0	0.60

Total Panel K$ (PY): 20.00 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.00

Total EC K$ (PY) = 0.00 (0.0)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 0.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: TECH. ASSESSMENT/DEVELOPMENT - PRODUCT STORAGE

OERD Project Number: 67205

2. Manager: R.S. Howarth

Department EC/EPS

Address: EPS/NWT District Office
P.O. Box 370
Yellowknife, N.W.T. X1A 2N3

Phone Number: (403) 873-3456

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	102.00	1.0
PERD As spent	73.50	0.5
EC As spent	0.00	0.5
Other As spent	0.00	0.0
Total As spent	73.50	1.0

4. Contractor(s): Moniteq Limited
630 Rivermeade Road
Concord, Ontario

5. 85-86 Objectives: - Redesign the front-end filtering system of the Oilspill unit to eliminate heat radiation interference with the gas signal (Phase I).
- Install selected filter system and test unit at RRETC and at Moniteq facilities (Phase II).

6. Accomplishments/Milestones Achieved:

- Spectral interference filters were compared to gas cell filters (GCF) in the Oilspills unit. Based upon the results of the tests, the GCF technique remains the best alternative for the detection of the target gas, propane. Signal response and rejection of false signals due to radiation changes was sufficient to provide a lower detectable limit of approximately 150 ppm-M. With modifications, the minimum sensitivity that can be expected is 20-40 ppm-M.
- The feasibility of achieving 10 ppm-M sensitivity for the unit by using active light sources was evaluated. The use of an incandescent light source appears to be a relatively inexpensive solution.
- At the conclusion of Phase I, it was recognized that an instrument sensitivity of better than 10 ppm-M was unlikely using a passive measurement technique. Phase II was therefore amended to provide a review of active devices that when coupled with the Oilspills sensor could achieve an overall instrument sensitivity of better than 10 ppm-M.
- At mid-year, re-staffing of the PY allocation was required. Although the staffing action was stalled because of the recent financial freeze, it is near completion. An offer has been made and the position is expected to be filled in April.

7. Problems Encountered/Resolution?

8. Publications/Reports in 85-86 or in Press:

1. Moniteq Ltd. 1986. Redesign of Oilspills Filter. Phase I. Final Report. Prepared for the Environmental Protection Service, NWT District Office.
2. Moniteq Ltd. 1986. Evaluation of Active Sources to Enhance the Sensitivity of the Oilspills Sensor. Phase II. Final Report. Prepared for the Evironmental Protection Service, NWT District Office.

9. Recommendations:

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: TECH. ASSESSMENT/DEVELOPMENT - PRODUCT STORAGE   OERD Project Number: 67205
2. Department/Service: EC/EPS
3. Proposed PERD Resources K$ (PY): 102.00 (1.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contrib-ution	Sal.& Ben.	(PY)		Fees Paid
			Sci./ Tech.	Admin.				Sci./ Auth.	Admin.	
18.40	0.00	0.0	0.0	0.0	25.60	0.00	28.50	0.5	0.0	1.0

Total Panel K$ (PY): 73.50 (0.5)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contrib-ution	Sal.& Ben.	(PY)		Fees Paid
			Sci./ Tech.	Admin.				Sci./ Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.5	0.0	0.0

Total EC K$ (PY) = 0.00 (0.5)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 0.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: REMOTE SENSING-CHRONIC OIL DISCHARGES

OERD Project Number: 67206

2. Manager: R.J. PERCEY

Address:
45 ALDERNEY DRIVE
DARTMOUTH, N.S.
B2Y 2N6

Department EC/EPS
Phone Number: (902) 426-2576

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	60.00	0.0
PERD As spent	52.00	0.0
EC As spent	0.00	0.1
Other As spent	0.00	0.0
Total As spent	52.00	0.1

4. Contractor(s):
SEAKEM OCEANOGRAPHY LTD.
46 FIELDING AVE.
DARTMOUTH, N.S.
B3B 1E4

5. 85-86 Objectives:
Phase III, is an investigation of ship/rig mounted remote sensing techniques and equipment useful in monitoring accidental and chronic discharges of oil and other drilling/production wastes. The information gathered will be useful for countermeasures planning and possible future compliance monitoring.

6. Accomplishments/Milestones Achieved:
- Contract let July 22, 1986 - $50,000.
- Contract amended November 11, 1986 - $6,315.
- November 22-27: Successful testing of remote sensing devices at Dalhousie University 10-metre high tower tank using variable oils and environmental parameters.
- November 27 - December 11: Successfully tested remote sensing devices in field at the Imperial Oil site on the waterfront in Dartmouth.
- Draft paper for Arctic and Marine Oil Spill Program Seminar on results of 1985/86 tests received from consultant.
- Draft final report received March, 1986.

7. Problems Encountered/Resolution?
Everything ran smoothly.

8. Publications/Reports in 85-86 or in Press:
- Phase I published in EE Report Series EE-54 "Remote Sensing Equipment for Chronic Oil Discharges", August 1984.
- Phase II published July 1985: EE-68 "Evaluation of Remote Sensing Technology for Monitoring Chronic Oil Discharges from Offshore Well Sites".
- Phase II results presented at AMOP seminar - June 1985.

-Phase III: Draft final report "Remote Sensing Chronic Oil Discharges" received March 1986.
-Phase III results to be presented at 1986 AMOP seminar in June.

9. Recommendations:

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: REMOTE SENSING-CHRONIC OIL DISCHARGES   PERD Project Number: 67206
2. Department/Service: EC/EPS
3. Proposed PERD Resources K$ (PY):   60.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	50.10	0.00	0.00	0.0	0.0	1.90

Total Panel K$ (PY):   52.00 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.1	0.0	0.00

Total EC K$ (PY) =   0.00 (0.1)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) =   0.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: FISH CONCENTRATIONS NEAR DREDGES — OERD Project Number: 67207
2. Manager: R.S. HOWARTH — Department EC/EPS

Address: EPS/NWT DISTRICT OFFICE
P.O. BOX 370
YELLOWKNIFE, N.W.T. X1A 2N3

Phone Number: (403) 873-3456

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	40.00	0.0
PERD As spent	0.00	0.0
EC As spent	0.00	0.0
Other As spent	0.00	0.0
Total As spent	0.00	0.0

4. Contractor(s): ESL ENVIRONMENTAL SCIENCES LTD.
1035 RICHARDS STREET
VANCOUVER B.C.

5. 85-86 Objectives:

- Recommend appropriate mitigation technologies for future Beaufort Sea dredging operations.
- Define areas of the Beaufort Sea which are sensitive to the effects of dredging.
- Define timing constraints related to marine dredging.

6. Accomplishments/Milestones Achieved:

- Developed a process for systematically assessing the effects of dredging projects on valued Ecosystem Components in the Beaufort Sea. The process involves assessment of the benefits derived from implementing mitigative measures, as well as the incremental impact associated with a number of activities. A workshop involving industry and other government departments was held to refine the process and to achieve a concensus on the use of the process to resolve conflicts related to approvals.
- The existing inventory of Beaufort Sea dredging activity was updated to the end of 1985 and converted to a computer data base to facilitate referencing.
- It quickly became apparent that there is insufficient information available to permit the definition of areas and times in the Beaufort Sea when biological resources would be susceptible to dredging related impacts.
- When this was recognized it was decided, based upon consultation with the steering committee, that development of the assessment process would be the best way to achieve a final product for this project.

7. Problems Encountered/Resolution?

8. Publications/Reports in 85-86 or in Press:

1. Martin. L.C., W.S. Duval and D.J. Thomas. 1986. A Process for Assessing

the Impact of Dredging Projects on the Biological Resources of the Beaufort Sea. Prepared by ESL Environmental Sciences Ltd. for the Environmental Protection Service, NWT District Office 95pp.

2. ESL Environmental Sciences LTd. 1986. Beaufort Sea: Historical Review of Marine Dredging. Prepared for the Environmental Protection Service, NWT District Office.

9. Recommendations:

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: FISH CONCENTRATIONS NEAR DREDGES — OERD Project Number: 67207
2. Department/Service: EC/EPS
3. Proposed PERD Resources K$ (PY): 40.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.00

Total Panel K$ (PY): 0.00 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.00

Total EC K$ (PY) = 0.00 (0.0)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 0.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: SUBSURFACE OIL   OERD Project Number: 67220

2. Manager: R.J. PERCY   Department EC/EPS
Address: 45 ALDERNEY DRIVE   Phone Number: (902) 426-2576
DATMOUTH, N.S.

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	60.00	0.0
PERD As spent	67.66	0.0
EC As spent	0.00	0.1
Other As spent	0.00	0.0
Total As spent	67.66	0.1

4. Contractor(s): D. MACKAY ENVIRONMENTAL RESEARCH LTD.
6 FAIRWAY DRIVE
SCARBOROUGH, ONTARIO
M1J 2R3
(416) 431-7525

5. 85-86 Objectives:
This study is the third in a series designed to investigate the chemical and physical properties of oil as they relate to subserface oil movement and, in particular, an overwashing phenomenon which was observed in the 1984/85 studies. The ultimate goal for this series of studies is to develop a model for predicting subsurface oil movement.

6. Accomplishments/Milestones Achieved:
In the first year of the project (1984/85), two contract studies were undertaken:

- "Study the Physical Behavior and Distribution of Weathered Oil in Tanks Having a Distinct Density Gradient"
  -Extracts from this report were used to support the EC presentation to the Hibernia Panel in November, 1985.
- "Determination of Oceanographic Factors Associated with the Subsurface Movement of Oil"

In the second year of the project(85/86), a third contract was undertaken:

- "Physical, Chemical and Oceanographic Factors Associated with the Submergence of Oil"

7. Problems Encountered/Resolution?
nil

8. Publications/Reports in 85-86 or in Press:
The final report from this study is due March, 1986. It will be published in the EE Report Series.

9. Recommendations:
Further research on the effects of: surface water currents on large oil masses and organic or mineral matter in the water column on oil density.

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: SUBSURFACE OIL OERD Project Number: 67220

2. Department/Service: EC/EPS
3. Proposed PERD Resources K$ (PY): 60.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	49.50	0.00	0.00	0.0	0.0	18.16

Total Panel K$ (PY): 67.66 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.1	0.0	0.00

Total EC K$ (PY) = 0.00 (0.1)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 0.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: MONITORING TECHNOLOGY OERD Project Number: 67225

2. Manager: R. S. Howarth Department EC/EPS
Address: EPS/NWT District Office Phone Number: (403) 873-3456
P.O. Box 370
Yellowknife, N.W.T. X1A 2N3

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	50.00	0.0
PERD As spent	50.00	0.0
EC As spent	16.00	0.1
Other As spent	0.00	0.0
Total As spent	66.00	0.1

4. Contractor(s): Subproject 1: Historical Compilation of Drilling Wastes Discharged to the Beaufort Sea.
ESL Environmental Sciences Ltd.
1035 Richards Street
Vancouver, B.C.
Subproject 2: Environmental Studies Design Criteria
Arctic Laboratories Ltd, Sydney, B.C.

5. 85-86 Objectives: To design a program to: i)define the natural variability of sediment parameters in the Beaufort Sea; ii)determine the optimum number of sample replicates for effective site specific regulatory monitoring programs and; iii)test the strategies and paramaters for sediment monitoring which are recommended in the Arctic Marine Methods Guide to determine whether or not they should be included in site specific regulatory monitoring programs.

6. Accomplishments/Milestones Achieved:

1. Support was given to an O.S.S. led project (B. Smiley Scientific Authority Contractor - ESL) to compile a data base listing wastes deposited in the Arctic waters by oil and gas drilling activites. The data base was completed and used to provide a rational basis for the selection of sediment monitoring parameters.
2. Arctic Laboratories Ltd. completed the following tasks:

- selection of sediment parameters
- refinement of the data base listing high quality sediment physical/chemical data which was produced by Dobrocky Seatech in 1984/85.
- analysis of natural variability in the existing Beaufort Sea sediment data
- development of a process for determining appropriate sampling intensity
- design of a program to test the conclusions of the final report.

7. Problems Encountered/Resolution?
Problems were found in the data base produced by Dobrocky Seatech Ltd. in 1984/85 and these were rectified by Arctic Laboratories Ltd. using EPS A-Base

funds.

8. Publications/Reports in 85-86 or in Press:

1. Turney, L., J.W. MacDonald, T. Sackman and E. Svendsen. 1986. Compilation of Historical Drill Waste Data Associated with Exploratory Drilling in the Canadian Beaufort Sea, Arctic Islands and Davis Strait Regions. A Report Prepared by ESL Environmental Sciences Ltd. for Fisheries and Oceans Canada, Evironment Canada, Indian and Northern Affairs Canada, and Canada Oil and Gas Lands Administration.
2. Arctic LAboratories Ltd. 1986. Environmental Studies Design Criteria: Beaufort Sea. A Report Prepared for the Environmental Protection Service under PERD Project 67225.

9. Recommendations:

It is recommended that the study design prepared in 1985/86 be implemented.

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: MONITORING TECHNOLOGY   OERD Project Number: 67225

2. Department/Service: EC/EPS
3. Proposed PERD Resources K$ (PY): 50.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	48.50	0.00	0.00	0.0	0.0	1.50

Total Panel K$ (PY): 50.00 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	15.10	0.00	0.00	0.1	0.0	0.90

Total EC K$ (PY) = 16.00 (0.1)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) = 0.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: PROTOCOLS/DRILLING FLUID TESTING

OERD Project Number: 67232

2. Manager: D. GOYETTE
Address: KAPILANO 100
WEST VANCOUVER

Department EC/EPS
Phone Number: (000) 666-2880

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	25.00	0.0
PERD As spent	17.00	0.0
EC As spent	0.00	0.0
Other As spent	10.00	0.0
Total As spent	27.00	0.0

4. Contractor(s): ENVIROCON LIMITED
#205-2250 BOUNDARY ROAD
BURNABY, B.C. V5M 323

5. 85-86 Objectives:
Complete project initiated in 1984/85.

6. Accomplishments/Milestones Achieved:
Successful development of a portable precise and sensitive laboratory technique to extract the biologically active portion of trace metals (Cd, Cu, Pb and Zn) in sea water and determine the toxic concentrations through biological assay (oyster embryo, algae).
Technique provides an efficient and sensitive method for estimating the biologically active portion of trace metal bearing liquids and evaluating toxic concentrations of selected organisms.

7. Problems Encountered/Resolution?
Some problems encountered with correlation between chemical measurement of cadmium and biological response requiring additional experimentation to resolve.

8. Publications/Reports in 85-86 or in Press:
Final report on Phase I - development of multi-element ion exchange procedure to measure cationic heavy metal concentrations and Phase II- to determine biological significance through oyster and algae assays due April 1986. Scientific publications are expected.

9. Recommendations:
Additional funding for testing solid pollutants; Additional development to modify procedure for application to trace metal bearing solids.

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: PROTOCOLS/DRILLING FLUID TESTING   OERD Project Number: 67232
2. Department/Service: EC/EPS
3. Proposed PERD Resources K$ (PY):   25.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	17.00	0.00	0.00	0.0	0.0	0.0

Total Panel K$ (PY):   17.00 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.0

Total EC K$ (PY) =   0.00 (0.0)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
NRC	10.00	0.00	0.0	0.00	0.0

Total Other K$ (PY) =   10.00 (0.0)

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART I
EC ANNUAL PROJECT REPORT
1985-86

1. Title: INTEGRATED HYDROCARBON MONITORING SYSTEM

OERD Project Number: 67237

2. Manager: R.J. Percy
Address: 45 Alderney Drive
Dartmouth, N.S.
B2Y 2N6

Department EC/EPS
Phone Number: (902) 426-2576

3. Resources Expended (85-86):

	K$	PY
PERD Proposed	0.00	0.0
PERD As spent	19.90	0.0
EC As spent	0.00	0.1
Other As spent	0.00	0.0
Total As spent	19.90	0.1

4. Contractor(s):

Martec Ltd. and Seatech Ltd.,
Dartmouth, N.S.

5. 85-86 Objectives:
-determine the hydrocarbon spills of relevance to this project (worldwide, since 1980); review the organization and basic elements of hydrocarbon monitoring during each of these spills and establish a list of potential contacts; design and implement a questionnaire and an interview pro forma as well as a computer program to handle the data; prepare a final report.

6. Accomplishments/Milestones Achieved:
-Contract was let January 13, 1986.
-Questionnaire distributed internationally in February, 1986 and excellent returns received.
-Project cited in "Oil Spill Intelligence Report" in February issue
-Draft final report received march, 1986.

7. Problems Encountered/Resolution?
-None

8. Publications/Reports in 85-86 or in Press:
-Final Report for year one work printed by June, 1986.

9. Recommendations:

INTERDEPARTMENTAL PANEL ON ENERGY R&D (PERD) PART II
EC ANNUAL PROJECT REPORT
1985-86

FINANCIAL SUMMARY

1. Title: INTEGRATED HYDROCARBON MONITORING SYSTEM   OERD Project Number: 67237
2. Department/Service: EC/EPS
3. Proposed PERD Resources K$ (PY):   0.00 (0.0)
4. Resources Expended K$ (PY):

(i) Panel Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	19.90	0.00	0.00	0.0	0.0	0.0

Total Panel K$ (PY):   19.90 (0.0)

(ii) EC Resources

Intramural					Extramural					DSS
O&M	Capital	Sal.&	(PY)		Contract	Contribution	Sal.& Ben.	(PY)		Fees Paid
			Sci./Tech.	Admin.				Sci./Auth.	Admin.	
0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.1	0.0	0.0

Total EC K$ (PY) =   0.00 (0.1)

(iii) Other Resources (i.e. DSS UP Fund, industry, provincial, etc.)

Source	O&M	Capital	Sal.& Ben.	Contribution	PY
	0.00	0.00	0.0	0.00	0.

Total Other K$ (PY) =   0.00 (0.0)